

FLIGHT

The
AIRCRAFT ENGINEER
AND AIRSHIPS

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Founder and Editor: STANLEY SPOONER

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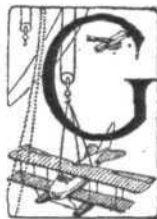
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INDEX FOR VOL. XXV.

The 8-page Index for Vol. XXV of "Flight" and "The Aircraft Engineer," January to December, 1933 (with over 7024 references for "Flight" and 197 references for "The Aircraft Engineer"—7221 in all), is now ready and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C.2, price 1s. per copy (1s. 1d. post free).

EDITORIAL COMMENT



GENERAL GROVES has two pet theories. One is that if Great Britain is attacked by air, the C.-in-C. Air Defence of Great Britain must be allowed to commandeer all the aircraft allotted to the Fleet and to the Army and use them for the defence of London. The other is that the next war will be what he calls a "war of areas," in which both sides will make deliberate attacks with gas bombs on the civil populations of enemy cities.

The first of these theories is only mentioned once in the book which **The Smoke Screen** General Groves has just written,* on page 27, and we may therefore dismiss it by saying that it would be equally sensible to claim for the Army a lien on all the guns and marines on naval warships, and that the air claim was very sensibly condemned by the Balfour Committee.

The second theory runs all through this book. It is supported by all the usual fallacious statements to the effect that all agreements are violated in war. Mr. Baldwin was once so injudicious as to support that fallacy. History shows, on the contrary, that "sensible" agreements, which do not attempt to deprive a belligerent of his natural rights, are usually observed in war. For one instance, in the Great War neither side used dum-dum bullets. Germany introduced the use of gas. It was a foul act, but, to be fair, it is admitted that Germany had not signed the

* **BEHIND THE SMOKE SCREEN.** By Brigadier-General P. R. C. Groves, C.B., C.M.G., D.S.O., formerly Director of Flying Operations at the Air Ministry, etc. With a preface by Major-General Sir Ernest Swinton, K.B.E., C.B., D.S.O.—(Faber & Faber. Obtainable from FLIGHT office). Price 15s. 6d. post free.

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

- 1934.
- Feb. 10. Services Rugby: R.A.F. v. R.N., at Twickenham.
 - Feb. 16. Bristol and Wessex Ae.C. Annual Ball, Grand Spa Hotel, Clifton.
 - Feb. 16. De Havilland Technical School Annual Ball, Stag Lane, Edgware.
 - Feb. 21. "Development of Aircraft and Its Influence on Air Operations." Lecture by Sq. Ldr. R. V. Goddard before R.U.S.I.
 - Feb. 22. Herts and Essex Ae.C. Annual Dinner and Dance, Wharnclyffe Rooms, Hotel Gt. Central, London.
 - Feb. 23. British Gliding Association Annual General Meeting, at R.Ae.S.
 - Mar. 1. "Speed and the Economics of Air Transport," Lecture by Maj. F. M. Green before R.Ae.S.
 - Mar. 2. Norfolk and Norwich Ae.C. Annual Dinner and Dance, Arlington Rooms, Norwich.
 - Mar. 6. "Relation of the Molecular Structure of Fuels to Their Behaviour in Diesel Engines." Lecture by G. D. Boerlage before R.Ae.S.
 - Mar. 15. "Some Developments in Aircraft Construction." Lecture by H. J. Pollard before R.Ae.S.
 - Mar. 21. "Some Problems of a Technical Service." Lecture by Wing Com. G. W. Williamson, before R.U.S.I.
 - Mar. 24. Services Rugby: R.A.F. v. Army, at Twickenham.
 - Apr. 5. "Engines." Lecture by Capt. A. G. Forsyth before R.Ae.S.
 - Apr. 12. "Speed and the Future of Commercial Aircraft." Lecture by M. Louis Breguet before R.Ae.S.
 - Apr. 26. "Landing in Fog." Lecture by Dr. Rüd Stüssel before R.Ae.S.
 - Apr. 27-May 6. International Aero Show, Geneva.
 - May. Wilbur Wright Memorial Lecture, before R.Ae.S.
 - June 30. Royal Air Force Display, Hendon.

Gas Convention at the Hague. Instances of "sensible" agreements which have been respected could be multiplied, while actual breaches of the accepted rules of war were not common in the last great struggle. Above all, as regards the arguments in this book, neither side used gas bombs or made any other deliberate attack on the civil populations of enemy cities.

Like other advocates of a bad cause, General Groves is very illogical in pressing the claims of frightfulness and baby-killing. On page 172 he argues that the quickest means to achieve a decisive end in war is to attack the people. "Nor can it be maintained that this course is other than the best strategy and that certain to be adopted." Eight pages later he writes "no responsible air authority advocates direct air action against a civil population." It is a little hard to reconcile those two statements. To proceed, it is always the other villain who will adopt "the best strategy" and make a beginning of the murderous business. Then the virtuous We will be forced to retaliate. Well, of course we shall. That needs no labouring. But with the knowledge that retaliation will promptly follow the crime, who will be anxious to make a beginning? If a German order to obliterate London meant the certain obliteration Berlin next night, would any Chancellor be iron enough to give the initial order? We can conceive only two possible cases of such an outrage: (1) if a nation were so confident of its own strength that it could afford to indulge in brutality, and (2) if a nation were so desperate that it had lost all sense.

General Groves admits in one place that a country's best defence against such air attack would be the enemy's fear of reprisals, but then he seems to forget that point. "A war may be won in forty-eight hours and the losses of the winning side may actually be nil!" Perhaps, if the other side had no power of striking back, but between Powers equally strong in the air the two slaughters would cancel each other without profit to either side. Again, we ask, who would wish to begin it? General Groves several times quotes the statement of Marshal Foch that air attack "may impress public opinion to the point of disarming the Government and thus become decisive." He had evidently not heard of Foch's conversation with General Seely (now Lord Mottistone), which the latter recently quoted. The gist of it was as follows: General Seely remarked, "Marshal, your flying corps could destroy London in a night," to which Foch replied "Yes, but yours could do the same to Paris next night, and so neither will happen."

Though this advocacy of unrestricted massacre takes up a great part of this book, it does not seem to be the real text. There is certainly a demand that our Air Force must be strengthened, and there we are quite at one with General Groves. The main object for writing the book seems to us to be indignation that our Air Force was reduced in 1919, and an outcry against the "military mind" which the author regards as responsible for the reduction. It was apparently the military mind (chiefly embodied in Lord Trenchard) which failed to see that all future wars would be wars of areas, *i.e.*, of gassing civilians, and therefore consented to the reduction of the Air Force in 1919. A great deal of space is occupied with examples of the futility of the military mind in the great war, and with much of it no one who

fought as an infantry subaltern in 1915 will be inclined to disagree. Still, infantry subalterns may be mistaken. Chiefly the workings of Lord Trenchard's military mind when commanding the R.F.C. and the Independent Air Force are attacked. The charge is made that at periods during the war, though we were superior in numbers of fighters and in performance of machines, yet our air losses were heavier than those of the Germans. The charge is novel, and it is interesting. It deserves further examination. Then the American General Patrick's book is quoted for the statement that Lord Trenchard admittedly fought against the idea of the Independent Air Force, but that it was forced upon him. It is also alleged that he did not use that force entirely for its proper purpose of destroying arsenals. For the moment baby-killing fades out of the picture.

What seems to be the kernel of the book is a paragraph on page 169: "It was because of this egregious mistake (*i.e.*, the attitude of the military mind towards the 'war of areas' theory), paralleled only by the failure during the war to grasp the possibilities of the strategic air offensive, that our post-war air policy envisaged national defence by a small but highly efficient force of fighters. And it was to that that Britain's air power was sacrificed in 1919." Of course the villain who sacrificed it was Lord Trenchard.

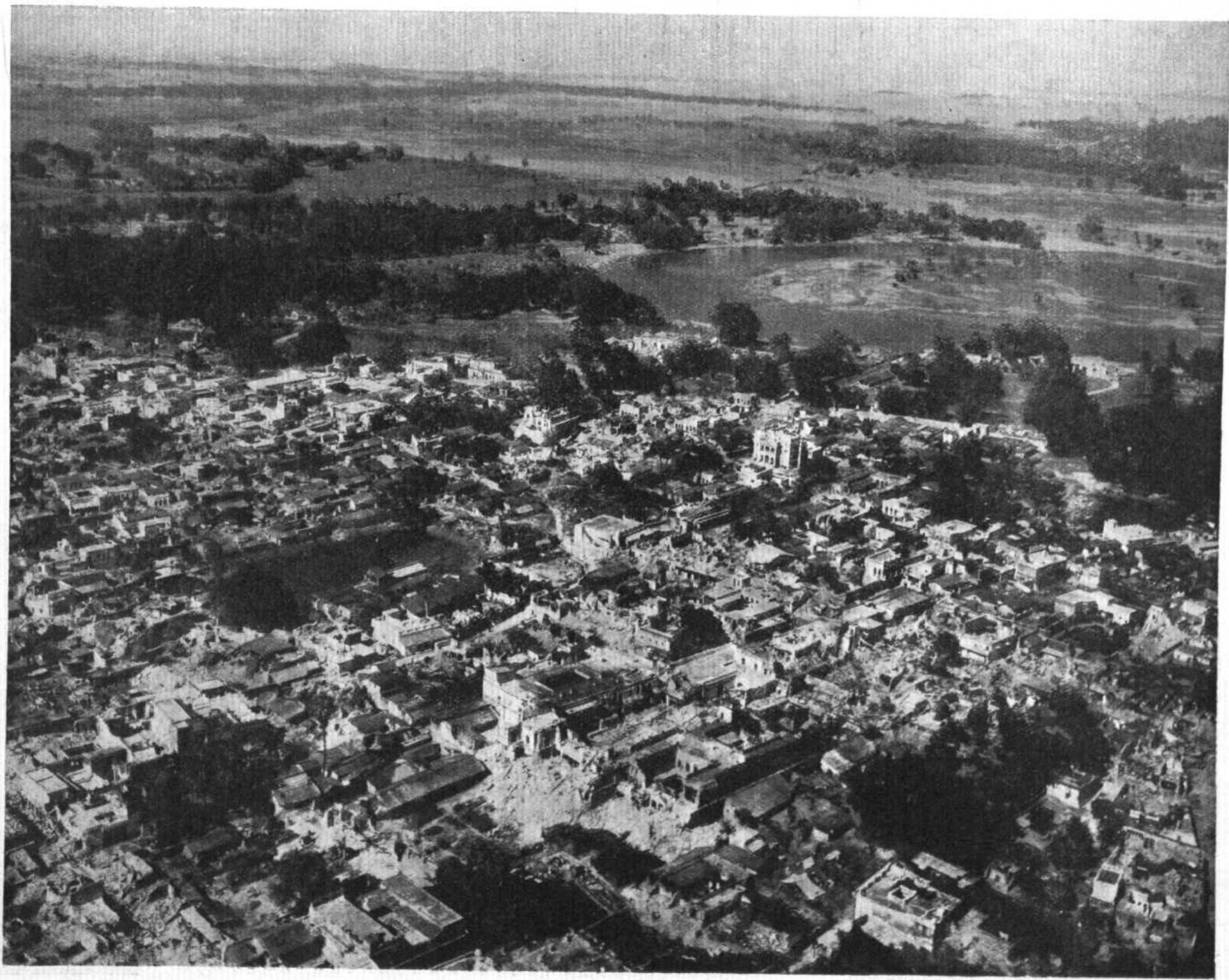
A Marshal of the Royal Air Force who is not employed on air duties is presumably at liberty to defend himself, and Lord Trenchard is quite capable of doing so, if he thinks it worth while. But in common fairness we must protest that in 1919 our air power, together with many other desirable things, was sacrificed to the supreme necessity of saving money. The Foreign Office said that there would be no other war for at least 10 years, and they were right. Britain, bled almost white, could afford no luxuries in defence Services when there was no call to use them. Drastic reductions were inevitable until our finances had somewhat recovered. There have been other reasons since as well as economy, namely, the desire to set a good example and also to placate American sentiment. The Chief of the Air Staff and a succession of Air Ministers were bound by these reasons. Now at last the time has come to build up again. General Groves' book will add somewhat to the demand for an increase in our Air Force, but it is a pity that a good cause should be helped by a book written in such a strain of bitter animosity.

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In a recent article in *The Times* Major Woods Humphery has explained that there is no technical objection to Imperial Airways running separate mail services in fast mailplanes, but that the division of passenger and mail services would, in his opinion, add to the cost of each and so make the company more dependent than it has been on Government subsidy. So far as fast mail services are concerned, we think that this position ought to be faced. Speedy carriage of mails is an advantage from which the whole community would benefit, and so special provision by the whole community would be justified, whether through the channel of the Post Office or otherwise. With regard to the passenger services we must hope that Major Woods Humphery is unduly pessimistic. The traffic is growing, and travellers appreciate the comfort provided by Imperial Airways.

Air Mail Services

THE INDIAN
EARTHQUAKE: An
aerial view—taken by
the Air Survey Co.,
Ltd.—of the city of
Muzaffarpur, Bihar
State, showing many
of the buildings in
ruins.



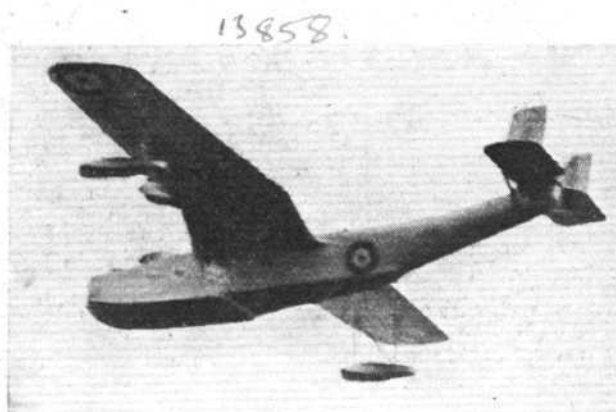
FLIGHT, FEBRUARY 8, 1934

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STRANGE angles in the wings of aeroplanes seem to be becoming the fashion. When the Handley Page 42 was first produced, the downward slope of the lower planes as they spring from the fuselage, and the upward angle of the planes for the outward portion of their span, struck the eye as very strange. In their latest flying boat Short Bros., Ltd., have reversed this arrangement. In the R.24/31 monoplane the wings begin by sloping upward in a pronounced dihedral, and then continue horizontally. That arrangement is so unusual that it looks stranger still. So does the shape of the hull, with the flat tumble-home sides. So does the contrast between the roomy, almost bulky-looking main body of the hull with the slim tapering tail. So does the absence of the usual graceful curves in the surfaces of the empennage. Altogether, the R.24/31 is a craft to make one open one's eyes, and perhaps to rub them. It is a craft whose appearance is quite foreign to the Medway. Yet the boat has a distinctly workmanlike appearance, and, knowing the work of the Short firm, one expects it to have rather more than a businesslike performance.

The last day of January was distinctly cool, especially by the water side. It was known that, wind and weather permitting, Mr. Lankester Parker would make a test flight

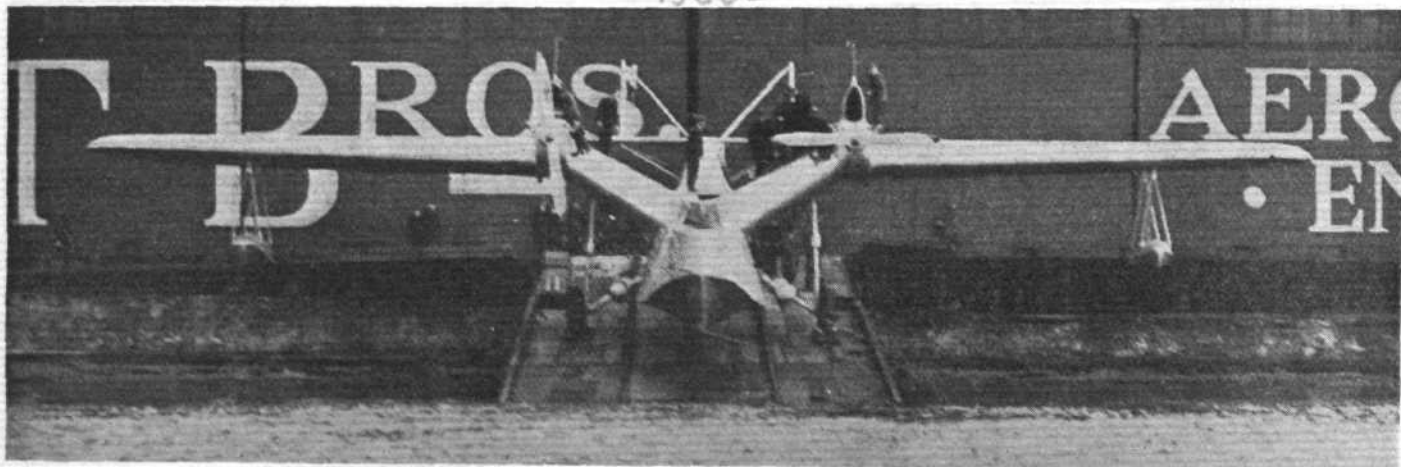


TESTING THE SHORT MONOPLANE R. 24/31

soon after high tide, which occurred about 1.45 p.m. Determined not to miss anything, a number of hardy Press photographers and kinematographers were on the spot long before that time, and before they had done their day's work they seemed very cool indeed. Mr. Parker looked rather astonished when he saw the assembly, and said he had not known that it was to be a Press view. He had only had the boat up twice, for very short flights, and he did not yet feel very familiar with it. However, about 2 p.m., when the more wary spectators arrived on the scene, the doors of the great shed were opened, and the monoplane was wheeled out. A peep inside the shed showed a veritable hive of industry. The *Scylla* ordered by Imperial Airways was prominent. Her construction is well advanced, and it looks as if they will have to take the shed down to get this great machine out. A "Rangoon," home from Basra for reconditioning, had had to be moved out to make passage way for the R.24/31, and was riding at moorings in the Medway. What Songs of Araby she could sing if only she had a voice! Somewhere in the shed the "Singapore" for No. 210 (Flying Boat) Squadron are rapidly going ahead, and the C.O. of the squadron was there to inspect their progress.

The monoplane stayed quite a while on the slipway

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UNORTHODOX: These views of the new Short monoplane flying boat (two Rolls-Royce engines) indicate the departure from normal external design. (FLIGHT Photos.)

13864



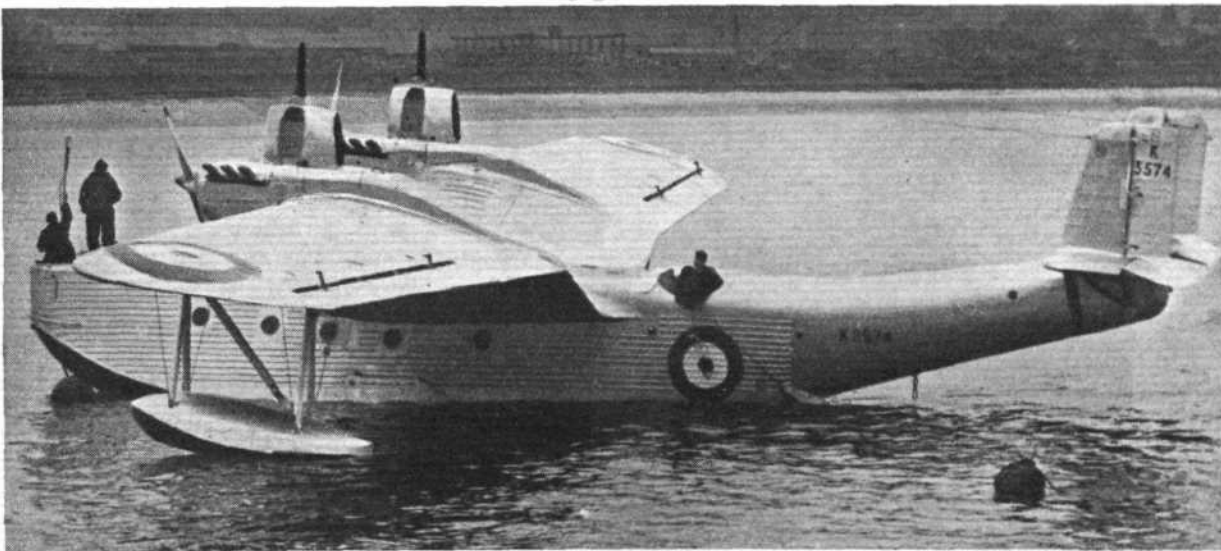
while her engines were run up and warmed and the spectators were cooled. At last she took the water very sweetly, and was duly moored to one of the famous rubber buoys. The beaching wheels were expeditiously removed by a man in a dinghy, and were towed ashore, the whole contraption of wheels, struts and flotation balloons looking somewhat like an animal which had been drowned some time ago. Final arrangements were made inside the hull, and then Parker went on board, while a motor-boat took the intrepid photographers for further cooling on the river.

The two Rolls-Royce engines started like lambs at the instance of the compressed-air starter, and Parker began to taxi about. The wind was slight, but what there was blew across stream, so Parker went upstream above the seaplane works, turned and opened up. The take-off was rather surprising. The boat did not sit back very far on her step. She did not cock her nose up in the air in the defiant manner of most flying boats, as though to say, "Now for it!" Something more seemed called for from

her, when suddenly she lifted off the water and flew. She was light, of course, but her run was very short, and no one seeing her for the first time would have expected her to come unstuck so quickly as she did. It was very impressive.

All aircraft are transformed when they fly. They look quite different in the air from the thing of metal and fabric which one has just seen on the ground or on the water. In the air the R.24/31 ceased to look weird. She became a living creature of the air. The up-and-out design of her wings gave her the look of a graceful seagull—and a high-wing monoplane is always the most beautiful of aircraft to see overhead. Parker circled round in wide sweeps, now disappearing as he sought the wide open spaces towards the Thames, then appearing again and swooping low as he gave the boat-load of photographers the chance for which they had waited so chillily. It was a fine sight, and the landing was also good. Now we must wait to see what Felixstowe thinks of the R.24/31.

13860



TAKING THE WATER : Two views of the Short R.24/31 going down the slipway at Rochester, and afloat on the Medway. (FLIGHT Photos.)



Control of Sunday flying

THE Air Ministry announces:—The Secretary of State for Air, Lord Londonderry, has requested the Committee under the chairmanship of Lord Gorell, which is reviewing a number of civil aviation questions, to investigate, in addition to the subjects already before it, that of Sunday

flying by civil aircraft. It is also, at the Secretary of State's request, to examine the position of gliding in this country. It will be recalled that the Committee has already had its original reference extended to comprise an investigation of the whole question of compulsory insurance for civil aircraft against third-party risks.

16,000 MILES IN 7 WEEKS

Lord Londonderry's Tour

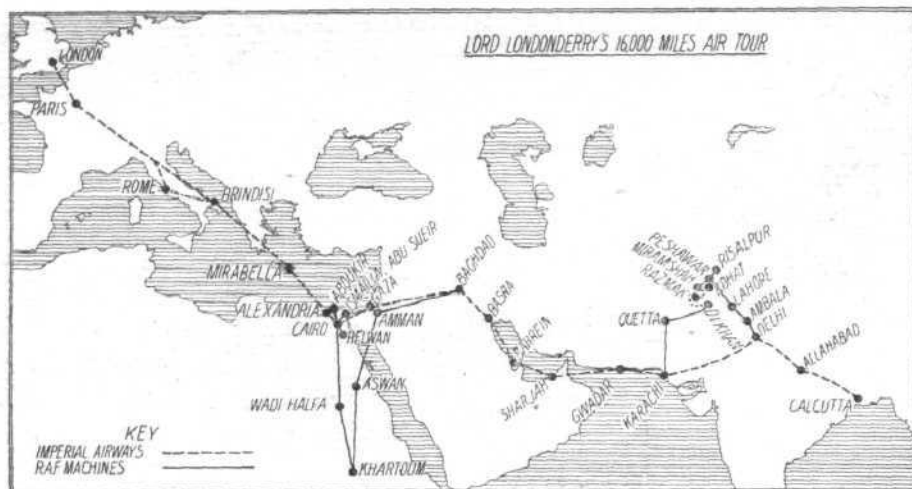
IMMEDIATELY after his return to London on February 2, the Secretary of State for Air gave an interview to representatives of the Press at Gwydyr House, Whitehall, and told them something of his tour of inspection of R.A.F. stations in Egypt, the Sudan and India. He had only been absent for seven weeks, and in that time he had covered a distance of approximately 16,000 miles. Only by travelling by air was this at all possible, and Lord Londonderry expressed the view that nowadays it was the duty of every Secretary of State for Air to visit these overseas units and to see for himself the conditions and circumstances under which they live and work.

Travelling partly by Imperial Airways' machines and partly in R.A.F. military aeroplanes, the Secretary of State for Air was able to obtain first-hand information about the way our great Imperial airline is gradually linking up distant parts of the Empire, and to discuss with local authorities along the route the developments and extensions which must take place in the future.

On the outward journey, Lord Londonderry travelled by Imperial Airways' route as far as Cairo, and it was on this part of the trip that the only delay during the tour occurred. This was due to the dislocation of railway services caused by the terrible French railway accident. Apart from this delay, the Secretary of State was able to complete his great tour according to the time-table laid down before the start.

From Cairo, Lord Londonderry visited R.A.F. units at Heliopolis, Aboukir, Helwan, Ismailia, Abu Sueir and Wadi Halfa, in service aircraft, and on January 31 he flew to Amman, via Heliopolis, in a R.A.F. machine, and continued the journey to Baghdad. From there he flew to Calcutta and Delhi in an Imperial Airways' machine, continuing the tour in R.A.F. machines to Lahore, Peshawar, Kohat, Risalpur and Miramshah. Razmak and Dera Ismael Khan were visited by motor, and the tour was then continued in service aircraft to Quetta and Karachi. The return journey was made by Imperial Airways.

Asked whether he had had any exciting adventures on the tour, Lord Londonderry replied that the only incident that came to mind was when attempting to get over the mountains on the way to Quetta. The machine was flying at



about 9,000 ft., and when it neared the mountains it got into a down current and dropped about 2,000 ft. in something like 10 seconds. A short time afterwards the twin-engined machine which carried the luggage of the party approached the same spot and was shot up 4,000 ft. in a very short time.

In a general way Lord Londonderry was very satisfied with everything he saw. The R.A.F. units were keen and were doing their work well.

Asked whether he considered the machines used by Imperial Airways fast enough, Lord Londonderry said that on the return journey they met very strong head winds between Sharjah and Baghdad, with the result that at times during the 950 miles flight they were only making good a ground speed of 20 m.p.h. He thought the demand for faster machines was bound to become more insistent. Greater and greater speed was the demand in all forms of modern transport.

On the subject of his negotiations in Italy, which it is hoped will result in Great Britain obtaining permission to fly Imperial Airways' machines the whole way and avoiding the tiresome train journey which now breaks into the pleasure of flying to Cairo, Lord Londonderry refused to be "drawn." All he would say was that he did not expect any difficulties to arise in our negotiations with Italy.

During the tour the Secretary of State visited the whole of the North-West Frontier and he spoke very highly of the beneficial influence which Great Britain exercises over this difficult and often disturbed area, and its enormous importance for the peace and safety of India as a whole. In the task we are carrying out there, Lord Londonderry said, the R.A.F. is working in the closest co-operation with the Army, and is developing that co-ordination of effort which can have no other result than that of increased and ever-increasing economy and efficiency.

Aerial Photography in Canada

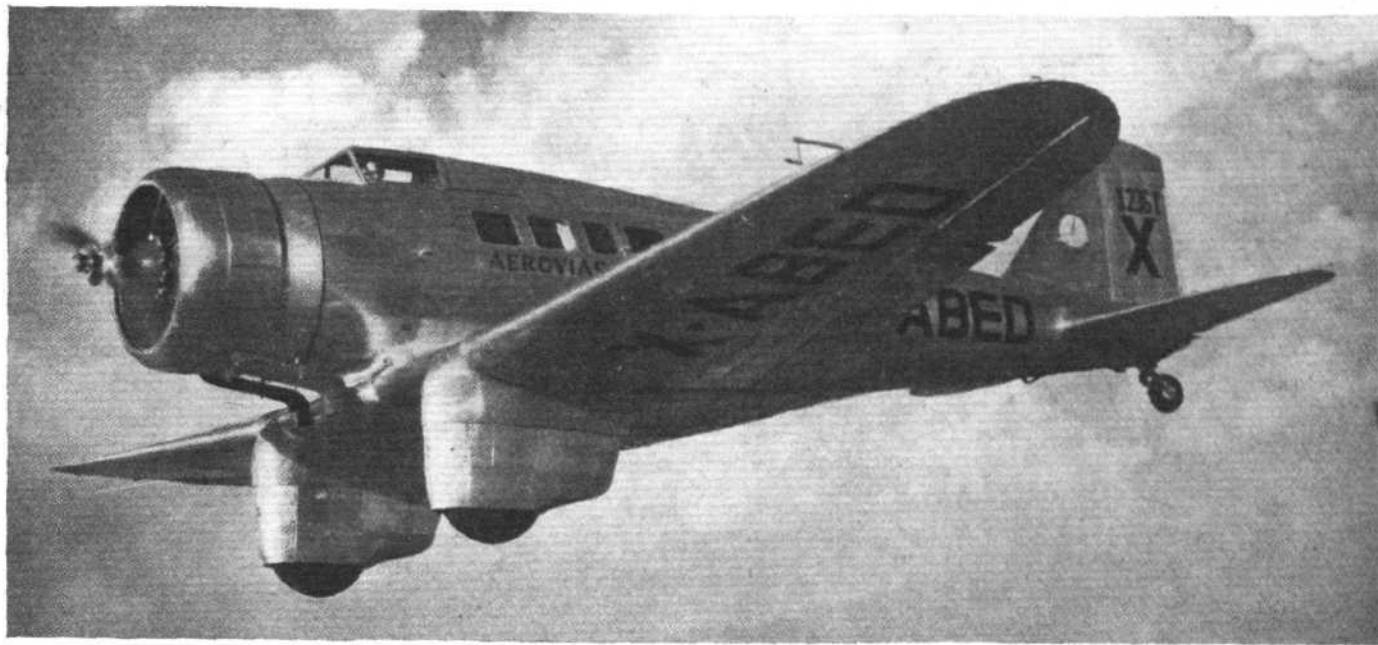
THE photographic library of the Topographical and Air Survey Bureau of the Dominion Department of the Interior at Ottawa has now collected more than 500,000 aerial photographs which are filed and indexed for consultation by business men seeking information for use in engineering and other development work. Visitors to the bureau include prospectors, mining engineers, hydro-electric power engineers, railway and transmission line builders, foresters, geologists and others interested in developing Canada's resources. The forester discovers the kinds of trees and the density of the forest, so that he can form an estimate of the stand and locate his roads; the water-power engineer sees the course which his canal must take and the place where the dam must go; the route of the railway or transmission line lies plain before the engineer, and the miner looks not only at individual rocks and up-turned strata, but views the geological structure over great areas, and can thus lay out his plan of campaign. Northern Canada alone is an enormous country, and the summer season is short. To examine it all, even with the aid of aeroplanes, will take many years; and if simply visually examined, or even sketched, the next prospector or prospecting company would have to do it all over again. It is for this reason that the Dominion Government, as a measure of the highest economy, is having aerial photographs made of areas which seem most immediately promis-

ing. Once this is done the results are not circumscribed or evanescent. The photographs are a permanent record, and they can be multiplied and sent to different parts of the country to be examined, not by one set of pioneers alone, but by all who seek any form of natural resource. The photographs are taken by the Royal Canadian Air Force and developed, indexed, and made available for public examination by the Topographical and Air Survey Bureau. This past season a portion of the appropriation available was devoted to aerial surveys in the vicinity of Great Slave and Great Bear Lakes, where major geological structures occur, and where important prospecting activities are now going forward. The work was successfully carried out and revealed an interesting "fault" or "dike" some 200 miles long, extending from Artillery Lake, east of Great Slave Lake, in a westerly direction to Slave River as straight, almost, as a parallel of latitude. The photographs of that "fault" tell an important story as to structure, and are of great value to the mining men of Canada who are interested in this part of the North-West Territories.

Breguet-Wibault

AN amalgamation of the Breguet and Wibault firms is now all but an accomplished fact, the agreement merely awaiting the signatures. The Penhoet firm will thus become independent, but will, it is thought, retain a certain interest in the new company.

AIR TRANSPORT & COMMERCE



THE LATEST NORTHROPS

The "Victoria" and "Delta" Models

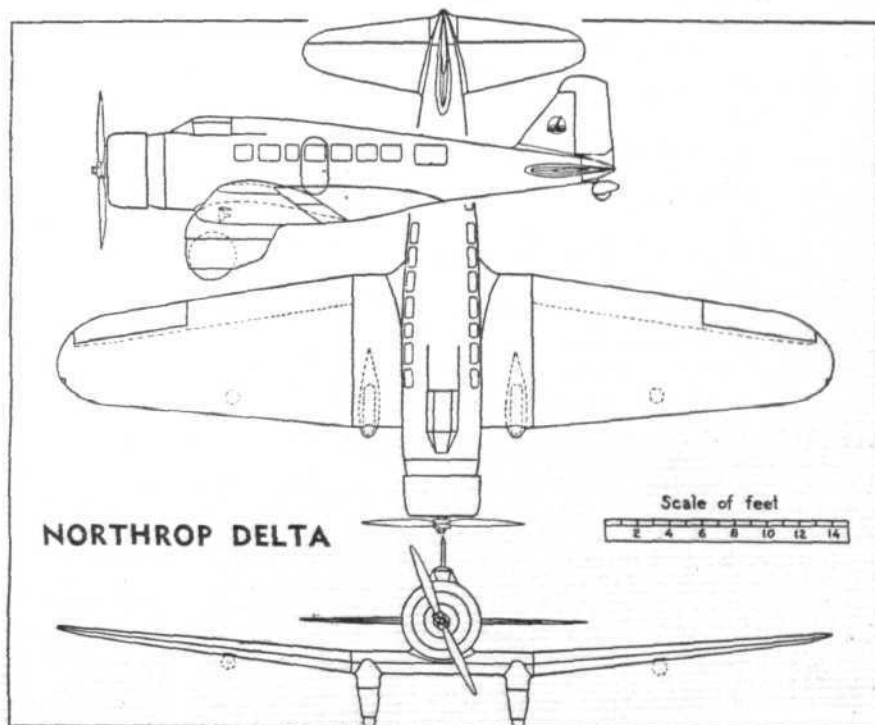
THESE latest additions to the Northrop range of civil aircraft are similar in general design to the "Alphas" which carry the Los Angeles-New York night mail for Transcontinental & Western Air. The "Alpha" was described in FLIGHT for September 11, 1931. It is claimed by the makers that as the result of improvements in structural and aerodynamic design the new machines have a very much larger pay-load capacity and considerably improved performance for a given horsepower. Engine and airscrew noises are reduced to a minimum through the use of sound deadening insulation throughout the cabin, and vibration is absorbed by insulating the engine on rubber cushioned mountings. The machine can fly for long periods with the pilot's hands and feet off the controls. Full lateral control is maintained beyond the stalling point of the wing even with flaps down. The split trailing edge flaps effect a big reduction in landing speed and length of glide. With flaps in the "down" position the maximum lift of the aerofoil is increased by 35 per cent. and the drag by 300 per cent.

Except where specifically stated, the following description will apply to both the "Victoria," which is intended for private service, and the "Delta" transport.

The fuselage is of Northrop all-metal stressed skin monocoque construction with longitudinal stiffeners and oversize reinforcing rings forming a structure well able to withstand abuse on the ground and in the air; 24S.R.T. Alclad is used throughout. Permanent jigged assembly of the fuselage and centre section forms these into a rigid integral unit. The centre section is arranged to carry six fuel tanks of 340 gallons capacity, permitting long range operation without encroaching upon the valuable cargo space in the fuselage.

An extremely clean cantilever type of landing gear is fitted. It has been proved that fixed undercarriages in which interference has been reduced to an absolute

minimum add very little to the drag of the aircraft and avoid the extra weight and complication of retracting gear. The Northrop type gear probably reduces the top speed less than 6 m.p.h. The gear consists of four cantilever oleo pneumatic struts with a streamline fairing enclosing the entire assembly. All parts of the gear, including the fairing, are quickly detachable, making tyre changing and wheel inspection rapid operations. The track is 9 ft. Bendix internal expanding brakes are differentially controlled by rudder pedals and may be set by a parking lever in the cockpit. Floats or skis are easily substituted for the normal land undercarriage. A bulkhead at the junction of the wing and centre section distributes all the landing loads and provides a quick and simple attachment for float struts and bracing wires. For the skis special oleo





THE NORTHROP "DELTA": Note the generous fillet at the junction of the wing and fuselage.

struts are used, which are attached through rigid struts to the ordinary landing gear fitted in the centre section.

The wing is of Northrop all-metal stressed-skin multicellular construction. All tension and compression loads are carried on the surface, only the shear loads being carried by internal webs. 24 S.R.T. Alclad is used throughout the wing. The ailerons are of the slotted type and are mounted on ball bearings. Control cables throughout the aircraft pass over ball-bearing pulleys. The empennage, like the wing, employs all-metal stressed-skin multicellular construction. Fin and tail plane are adjustable on the ground and fore and aft trim during flight is accomplished by the use of "Flettner" mounted on the elevators and controlled from the cockpit. The tail wheel is of the full swivelling type, but may be locked in the forward position from the cockpit.

The cabin of the "Delta" provides accommodation for eight passengers and contains approximately 200 cu. ft. of space. The fully-upholstered seats are 19 in. wide, and individual windows, reading lights, ash-trays and ventilation controls are provided by each seat. A second heating and ventilation system controlled from the cockpit admits either heated air or air at "outside" temperature to the cabin. The door of the cabin is on the port side of the fuselage and an emergency exit is provided on the forward starboard side. A lavatory may be installed if one of the rear seats is omitted. Located aft of the cabin is a baggage compartment of 35 cu. ft. A large door is provided and the compartment is equipped with a dome light.

Accommodation for six is usually provided in the cabin of the "Victoria." As the machine is intended for the

owner-pilot, however, the cabin may be arranged to meet individual requirements, and several alternative arrangements are possible. The seats are usually 19 in. wide and such refinements as individual reading lights, ash-trays, lunch and card trays, ventilation control and assistance cords may be provided. The arrangement of the two forward seats permits the owner of the aircraft to fly the machine himself without separating from his guests. Dual controls are provided and the instrument board is mounted in rubber, which damps vibration at all periods of flight. The cabin is otherwise generally similar to that of the "Delta."

The usual power plant for the "Victoria" is the Pratt & Whitney "Wasp," S.I.D.I., rated at 525 h.p. at 5,000 ft. This engine uses fuel of 80 octane number and if a lower octane fuel is desired there will be a decrease in performance due to smaller h.p. output. All engine controls, wing, fuel system and instrument leads have quickly-detachable connections, making possible the replacement of the entire power plant within 30 min. The oil tank, which is of 20 gallons capacity, is mounted on the engine-bearing members and forms a unit which is removable with the power-plant assembly. As a fixed-pitch airscrew does not possess satisfactory characteristics for both take off and speed in high-speed aircraft, a variable-pitch airscrew is usually fitted to the latest Northrop models. The "Delta," having a somewhat larger fuselage than the "Victoria" and carrying a larger load, is usually powered with the Wright "Cyclone" S.R.-1820 F-3 engine, of approximately 700 h.p., or the Pratt & Whitney "Hornet" of 660 h.p. may also be fitted.

THE NORTHROP "VICTORIA"

Length	29 ft. 9 in.
Span	48 ft.
Wing area	363 sq. ft.
Angle of incidence	2½ deg.
Aerofoil section	N.A.C.A. 2400
Maximum width of cabin	44 in.
Maximum height of cabin	55 in.
Weight (empty)	3,600 lb.
Disposable load	3,400 lb.
Wing loading	19.2 lb./sq. ft.
Power loading	9.8 lb./h.p.
Engine	Pratt & Whitney "Wasp" S.I.D.I.
Top speed at altitude	200 m.p.h.
Cruising speed at 75 per cent. power output	182 m.p.h.
Landing speed (fully loaded)	58 m.p.h.
Gliding angle (without flaps)	15-1
Gliding angle (with flaps)	5-1
Service ceiling	18,000 ft.
Cruising radius at 171 m.p.h.	2,100 miles.

THE NORTHROP "DELTA"

N.B.—Except for the following, the main data applying to the "Delta" are the same as those for the "Victoria."

Length	32 ft. 5 in.
Maximum width of cabin	57 in.
Maximum height of cabin	60 in.
Weight (empty)	3,600 lb.
Allowance for radio, cabin and miscellaneous equipment	500 lb.
Disposable load	2,900 lb.
Total weight	7,000 lb.
Engine	Wright "Cyclone" S.R.1820 F.3
Top speed at 8,000 ft.	221 m.p.h.
Cruising speed at 75 per cent. full power at 8,000 ft.	201 m.p.h.
Cruising speed at 75 per cent. full power at 12,700 ft.	212 m.p.h.
Landing speed (fully loaded)	58 m.p.h.
Take-off run (flaps down)	565 ft.
Service ceiling	24,800 ft.
Maximum cruising radius at 200 m.p.h. at 15,000 ft.	1,790 miles.

AIR TRAFFIC CONFERENCE AT BERLIN

A CONFERENCE of the International Air Traffic Association has just been held in Berlin, at which representatives from 30 nations, controlling 60,000 miles of regular air lines, attended to arrange the summer time-tables of the great network of European airways. Arrangements are being made for the airlines of all nations to interconnect, and it would be possible this summer to book a through ticket by air from London to 150 Continental cities and towns, the majority of which would be reached in a single day from London.

Herr Hitler, addressing the conference, said: "In consequence of its geographical position, Germany is particularly

interested in encouraging international air traffic in every possible way. The present German Government is firmly convinced that air traffic will be the traffic of the future. When this means of transport shall have been accepted everywhere and the harvest of its peaceful destination is ripe, then it would also be possible to deprive the aircraft of its character as a military weapon."

THE AMSTERDAM-HULL SERVICE

ROYAL DUTCH AIR LINES state that the new air service to England will start on June 1 and have its terminal at Liverpool, with a stop at Hull. It will be a daily service. From Liverpool there will be air mail connection at Amsterdam for Scandinavia and Central Europe.

MIDLAND AND SCOTTISH AIR FERRIES, LTD.

WITH Mr. J. C. Sword and Mrs. C. G. Sword as Directors, Midland & Scottish Air Ferries, Ltd., was formed early last year with a nominal capital of £20,000, one of the main objects of the company being the operation of aircraft. The offices of the company are at Renfrew Aerodrome; 18, Royal Avenue, Grand Central Hotel, Belfast; Strath Field Aerodrome, Campbeltown; Duich Aerodrome, Islay; and Hooton Park Aerodrome, Liverpool. From Renfrew, which is five miles west of Glasgow, services have been operated by the company to Belfast and Campbeltown and Islay. The following are the time-tables applying to the services at present in operation:—

WINTER TIME TABLE

GLASGOW to BELFAST

Leave	10, West Nile Street, Glasgow	8.30 a.m.	1.30 p.m.
Arrive	Renfrew Aerodrome	9.00 "	2.00 "
Leave	Campbeltown Aerodrome	9.40 "	2.40 "
Arrive	Campbeltown Aerodrome	9.50 "	2.50 "
Leave	Aldergrove Aerodrome	10.30 "	3.30 "
Arrive	Grand Central Hotel, Belfast	11.10 "	4.10 "

BELFAST TO GLASGOW

Leave	Grand Central Hotel, Royal Avenue	8.20 a.m.	2.20 p.m.
Arrive	Aldergrove Aerodrome	9.00 "	3.00 "
Leave	Campbeltown Aerodrome	9.40 "	3.40 "
Arrive	Campbeltown Aerodrome	9.50 "	3.50 "
Leave	Renfrew Aerodrome	10.30 "	4.30 "
Arrive	10, West Nile Street, Glasgow	10.50 "	4.50 "

REDUCED FARES

From November 13, 1933

	Single	Return
	£ s. d.	£ s. d.
Belfast to Glasgow	2 0 0	3 10 0
" Campbeltown	1 5 0	2 0 0
Glasgow to Campbeltown	1 5 0	2 0 0

Children under 10 years of age Half Fare

GLASGOW TO ISLAY

Leave	10, West Nile Street, Glasgow	8.30 a.m.
Arrive	Renfrew Aerodrome	9.00 "
Leave	Campbeltown Aerodrome	9.40 a.m.
Arrive	Duich Aerodrome, Islay	9.50 a.m.
		10.15 a.m.

ISLAY TO GLASGOW

Leave	Duich Aerodrome, Islay	10.30 a.m.
Arrive	Campbeltown Aerodrome	10.55 a.m.
Leave	"	11.05 a.m.
Arrive	Renfrew Aerodrome	11.45 a.m.
"	10, West Nile Street, Glasgow	12.05 p.m.

REDUCED FARES

From November 13, 1933

	Single	Return
	£ s. d.	£ s. d.
Glasgow to Campbeltown	1 5 0	2 0 0
" to Islay	2 0 0	3 0 0
Campbeltown to Islay	1 0 0	1 10 0

Besides the regular services of the company, an efficient air taxi service is in operation, and has proved of great assistance to northern business men.

On March 14 a service will be inaugurated between London and Glasgow, with Birmingham and Liverpool as intermediate stops. This service will probably be operated once each way per day and the fare should be about £10 10s. Another service is to be started from London to Belfast, calling at Birmingham, Liverpool and the Isle of Man. Two trips each way will be made daily, and the fare will probably be about £10. In the near future the company intends to survey the Western Isles with the intention of extending their present services up to Stornoway. It is likely that calls will be made at Tiree or Coll, Barra, Benbecula or Uist. The trip will probably be made once a day, returning on the following day, and calling at the same ports.

The types of aircraft at present being used by the company include the "Avro X" (3 "Lynx"), Airspeed Ferry (3 "Gipsies"), D.H. "Dragon" eight-seater (2 "Gipsy Majors"), and D.H. "Fox Moth" ("Gipsy Major").

The latest acquisition of the company is what it calls the "flying hospital." This is the first of its kind in Scotland, and will be used to convey serious cases of illness from the Highlands and Islands to hospital in Glasgow. Provision is made for the patient to receive attention during flight.

ROYAL DUTCH AIR LINES TRAFFIC

THE K.L.M.'s operating results in 1933 have been exceedingly favourable. The weight of mails transported by the well-known Amsterdam-Batavia service was 44,523 kilogrammes (43 tons 1,650 lb.), which, when compared with 35,296 kilogrammes for 1932, represents an increase of 26 per cent. Passenger traffic is also developing rapidly on the Indies line; passenger-kilometres amounted to 3,624,161 (2,252,418 passenger-miles) during 1933, against 1,899,317 passenger-kilometres for the previous year. An increase of 110 per cent. Two four-engined Fokkers, which will give still more speed and comfort to travellers as the actual F.XII and F.XVIII standard aircraft on this route, will be put into service this year. One is a Wright "Cyclone"-powered monoplane of F.XXXVI type, with four cabins, which can carry 16 passengers and has sleeping accommodation. The other is an F.XXII type Fokker, equipped with four 540-h.p. Pratt & Whitney "Wasps," also having four cabins and sleeping accommodation, carrying 10 passengers. Both have a 225-kilometre (140 miles) cruising speed. They are to be considered as the future standard types of airliners on the K.L.M.'s Amsterdam-Batavia route, which will cross to Java within six days. European air traffic also increased in an extraordinary way. K.L.M. carried 40,082 passengers on regular lines, against 20,877 during 1932, which represents an increase of 92 per cent. Goods traffic also was the largest yet recorded in one year, the amount being 1,196,257 kilogrammes (1,177 tons). Mails amounted to 147,261 kilogrammes (145 tons), as compared with 1932, an increase of 9 per cent. For 1934 a new service—already referred to in FLIGHT—across the North Sea, from Amsterdam to Hull, has been announced, which will be opened June 1 next.

A NEW IRISH PROJECT

PLANS have been made by a group of Irish capitalists to form an all-Irish company, with the provisional name of the Irish Aviation Development Corporation, to operate a twice-daily air service for passengers and goods between Dublin, Waterford, Cork and Limerick with a possible extension of the service to Liverpool or Manchester. They

propose to use three-engined Junkers machines on the service, and will also acquire light aircraft for special charter work. Mr. T. O'B. Kelly, a director and secretary of the Irish Aero Club, is interested in the venture, and it is understood that preliminary negotiations for the necessary capital are progressing favourably. Application has been made to the Free State Government for a lease of the old military aerodrome at Collinstown, near Dublin.

JERSEY AIRWAYS

JERSEY AIRWAYS, who made a successful start last week on the Heston extension of their Portsmouth-Jersey service, took delivery on February 1 of another "Dragon"—the 1934 model with extra-clean fairing—which left at 11 a.m. on the daily service. Bookings have so far been encouraging, and further machines will be put into service as the need arises. Jersey Airways is probably the first British company to operate regularly from a beach (they alight on the sands opposite the Grand Hotel at St. Helier), and the tide will necessitate an alteration in the starting times on three days in every fortnight. The next dates to be affected will be February 8, 9 and 10, when the service will leave Heston at 11.45, 8.30 and 9.30 respectively.

GERMANY-SOUTH AMERICA SERVICE STARTS

ON February 3 the fast fortnightly air mail service between Germany and South America started, when a Luft Hansa Heinkel H.E.70 machine left Stuttgart, with 400 lb. of mail, at 8 a.m., for Seville, en route for Brazil and Argentina. At Seville the mail is transferred to a Junkers machine, which takes it to Las Palmas, whence it is carried to Bathurst (Gambia) by another aeroplane. Here it is transferred again to a Dornier "Wal" seaplane, which makes the service across the Southern Atlantic via the German floating station, the *Westfalen*.

ANOTHER "CRUISER" FOR YUGOSLAVIA

SPARTAN AIRCRAFT, LTD., of Cowes, have received a repeat order for a Spartan "Cruiser" (three "Gipsy Majors") from the Aeropot Co., of Yugoslavia. They have also granted a licence to manufacture Spartan "Cruisers" to the same company.

FROM THE CLUBS

CINQUE PORTS FLYING CLUB

Friday evening, February 2, was the sixth occasion upon which the members of the Cinque Ports Flying Club have met together with their guests for their Annual Dinner and Dance. A room in the Royal Pavilion Hotel at Folkestone was suitably decorated with the Club's colours of grey, red and blue, and therein 130 persons sat down to dinner.

They enjoyed themselves, obviously and sincerely. They had an unusually good dinner, as a foundation for the evening's pleasure, and those inimitable singers, Sandra Svenska and Georges Seversky, ably accompanied by V. Launitz, as *pièces de resistance*. The manner with which the songs were received spoke volumes for the capability and popularity of these artistes. Georges, a war-time Russian pilot, has been a member of the Club for some considerable time, and Sandra, as an outcome of the evening, is now an honorary member. She hopes to become a pilot so that she can fly about fulfilling her engagement, in the same way as Georges. Georges Seversky is the brother of Maj. A. Seversky, who, as our readers will remember, designed a record-breaking amphibian aircraft in America. The machine was fully described in *FLIGHT* for November 16, 1933. The Severskys are essentially an air family, and have the unique record of having a father and son both serving as pilots in the same squadron during the war. The father holds one of the earliest Russian licences. Georges is also something of a designer, and, if his plans materialise as he hopes, we shall be able to publish the details of an aeroplane which will have many new and interesting features.

CAPT. L. A. R. BRADDELL, the Chairman of the Club Committee, presided at the dinner, and in extending a welcome to the guests, commented upon the admirable progress which had been made by the Club. This, he felt, was largely due to the fact that the directors of their parent company had allowed them to make good on their own and in their own way. The result was that the child had almost done better than its parent, and their manager, Mr. W. E. Davis, had received his well-earned reward by being given a seat on the Board.

Tribute was paid to the instructors. Their Chief Instructor, affectionately known to everyone as "K.K.," had the enviable record of five years' service with the Club, during which he had not been concerned in any accident or damage to the aeroplane whatsoever. He was now most ably assisted by Mr. Ken Waller. These two had, between them, turned out 34 "A" licensed pilots and two "B" licensed pilots this year.

The Club's machines had flown 1,344 hr. during the year, an increase of 40 per cent. over the previous year, an amount which was to a very large extent made possible by the excellent maintenance by the ground staff under Mr. Patterson.

The Club had had a successful year with races and meetings, and these had been well attended. Organising the International Flying Meeting was a bold, but nevertheless successful, venture. When called upon, the members had rallied round well and had helped enormously with volunteer work.

In conclusion, he suggested that, while they were getting good support from most quarters, Folkestone itself could do a great deal more to help.

SOD. LDR. A. L. PAXTON, commanding No. 25 (Fighter) Squadron at Hawkinge, replying for the guests, spoke only as a substitute for Lt. Col. F. C. Shelmardine, the Director of Civil Aviation, who was detained abroad. The Club, he said, had always been a very good friend to

Mrs. Paxton and himself, and he was always ready to help it in any way, with the permission of the Air Council, that he could.

MR. W. E. DAVIS, manager of the Club, also spoke feelingly of the support which he got consistently from the members, and referred to this support as the reason for the Club's prosperity. The kind of support he meant was exemplified by the action of Sqd. Ldr. Paxton, who had flown down, specially for the dinner, from Wittering, where he was doing a blind-flying course.

Mr. Davis also thanked Col. W. Ozanne, of the Small Arms School at Hythe, for coming to the dinner, expressing regret that Lt. Col. H. Street was not also able to be present.

In concluding, he told how, when in Paris with Mrs. Davis, he had met Georges Seversky, and how that sportsman had not only offered to come over to the dinner, but also to bring Sandra Svenska with him. In view of the fact that both of them had had late engagements the night before, he thought it was extraordinarily good of them to come. He then announced that the Committee had unanimously elected Sandra an honorary member of the Club.

EAST ANGLIAN AERO CLUB

On Wednesday, January 31, the East Anglian Aero Club held their first annual dinner and dance. The Club, as our readers know, has been formed by Commercial Airways, Ltd., at Abridge Aerodrome, Essex. As Mr. Lewington, the energetic secretary, pointed out when replying to the toast of "The East Anglian Aero Club," a toast which had been very ably proposed by Miss Butterfield, that, although the Club only started in March last year, it can already boast of 178 members, of which 100 are flying members, a larger percentage number than any other flying club in existence. Mr. Lewington expressed the hope that the Club would be able to get the Government subsidy before very long.

SIR ALLIOT VERDON ROE proposed the toast of "Civil Aviation." In doing so he recalled an extremely amusing incident and a very significant one, when looked back upon, which occurred five years before the war. In that time the Government granted an interview to about half-a-dozen pioneers, of which he was one. Col. Seely met the party and showed them into Mr. Haldane's room (now Lord Haldane). The group explained why they had come and hoped that the Government would see its way to placing



THE MORNING AFTER: On Saturday morning last, after the Cinque Ports Flying Club's annual dinner, many members gathered at the club at Lympne despite the biting cold wind. The group here is: (left to right) Mr. Ken Waller, the second instructor; Mr. Georges Seversky; Mr. W. E. Davis, the Club's manager; Miss Sandra Svenska. The background is one of the Club's "Moths" ("Gipsy I"). (FLIGHT Photo.)



THE PASSING OF A LINK WITH THE PAST: The historic hangars—or as they were more generally styled “sheds”—at Brooklands, where many British pioneers of flying carried out their adventurous activities round about 1910 and onwards, have all been demolished to make room for modern buildings. Our picture shows the last of the sheds—near the Byfleet bridge—where Gordon England, “Tommy” Sopwith, etc., were domiciled. In more recent times the Henderson Flying School had these sheds, and, later, Duncan Davis opened the Brooklands School of Flying here. (FLIGHT Photo.)

an order with each of them for an aeroplane, as they felt convinced that, in the event of war, these could be used for a number of purposes. Mr. Haldane merely looked bored and all that Col. Seely said was: “Gentlemen, you must bear in mind that we are the trustees of the public purse and, as we do not see there is any possibility of ever using aeroplanes for war purposes, we regret that we can offer you no encouragement.” (It would be interesting to know the names of the pioneers who attended that conference.—ED.)

MR. LIPTON replied to the toast, stressing the need for a greater number of aerodromes in this country, and giving his listeners some idea of the great advance which had been made not only with internal air lines in this country during the past twelve months, but also over the Empire air routes. He pointed out that operators were at last beginning to realise the need for comfort in the air, and opined that to the provision of this comfort was largely due the greatly increasing number of passengers carried.

MR. J. GRIFFITHS, JUNR., proposed the health of “The Chairman” in a speech telling his listeners of the excellent work which the chairman had done for aviation.

The dance was very well attended, and the Embassy Band provided the necessary rhythm. If the keenness of the members shown at this dinner is carried out in flying, the Club should do well.

HATFIELD

London Aeroplane Club machines flew 145 hr. 5 min. during the month of January, and 49 hr. 20 min. during the past week. Messrs. S. G. Shott and J. G. Campbell made first solo flights during the week, and new members whom the Club have pleasure in welcoming are Miss Tindall, Capt. W. Summers, Messrs. W. E. Nixon, of D.H.'s, and L. H. Sumanadasa. The flying times of the R.A.F. Reserve Flying Club totalled 9 hr., and the R.A.F. Reserve 36 hr. 30 min. Mr. C. A. Pike has just returned from Cairo, where he delivered a D.H. “Dragon” to Wilson Airways. Mr. G. M. Cox flew to Catterick on Wednesday, January 31, to collect Mr. Mollison's “Dragon,” *Seafarer*, which is to be housed at Hatfield. Visitors to the aerodrome included Mr. Shuttleworth in a Desoutter, Mr. Gordon-Marshall in a “Leopard Moth” and Mr. Tangye in a Comper “Swift.” Capt. Monohan and Capt. Bristol, of the American Embassy, put in some flying on their “Puss Moth,” Mr. Miskin did a cross-country flight to Lympne and Sir Derwent Hall-Caine went for a short flip in his “Leopard Moth.” A new private owner is Mr. Whittone, who owns a “Moth.” A squash team has been

raised among members of the Club, and are open for mid-week fixtures.

BROOKLANDS

The improvement in the weather has increased flying times, the total for the past week amounting to 39 hr. Two enthusiastic private owners, Messrs. Opie and Morris, have been up at 7 a.m. on many mornings putting in hours before proceeding to strenuous work in London. It is encouraging for the Club to find that many old members are rejoining. New members during the week included the Rev. and Mrs. Pyddocke, Miss E. Lay, Messrs. J. A. Borley and J. G. Jeffcoat. Mr. Kitley has finished his “A” licence and Messrs. Anderson, Harrison and Addinsell are striving towards “B” licences. Cross-country flights were carried out to Lympne, Hamble, Bristol and Hatfield. The Sales Department is being kept busy demonstrating machines, as intending purchasers seem to realise that now is the right time of year to buy. Orders for D.H. machines should be hastened, as there is already a long waiting list for new aircraft. Mr. Ted Walters has purchased a “Gipsy Moth” and one has been shipped abroad. The Repair Department is keeping up its reputation of always being busy, and several C. of A. jobs have been completed during the week. A very successful party was held on Saturday, February 3, when a most interesting film was shown dealing with the early days of aviation. Bill Thorn was given a very cheery send-off on Sunday evening, and all who knew him at Brooklands wish him a very successful future.

HANWORTH (N.F.S.)

The total number of hours flown in Club machines during the month of January amounted to 164 hr. 45 min., representing an increase of 19 per cent. over the corresponding month of last year. The week's flying time totalled 43 hr. 25 min. Very satisfactory progress is being made by pupils in training for “B” licences, and Messrs. von Bahr, Walters and Back passed their cross-country tests during the week, Mr. von Bahr was also successful with a further test which he carried out at Hendon. Mr. Revell took cross-country dual instruction and flew to Leeds with Mr. Llewellyn. The Social Club held a very successful dance in Victoria Hall on Friday evening, February 2, during which a presentation was made to Mr. Stockhausen on leaving the service of N.F.S. to take up a position with the Aeronautical Inspection Directorate.

HOUSEHOLD BRIGADE FLYING CLUB

The Committee of the Household Brigade Flying Club have decided to devote the funds usually allocated to their

annual display, which will not take place this year, to offering members a limited number of hours' flying at cheaper rates. Members without licences may take up to three hours' dual instruction, and licensed members up to two hours' solo flying, at 10s. an hour, on the Club aeroplane, until the sums allotted are exhausted. A 10 per cent. reduction on fares for air travel is offered this year to members of the Household Brigade Flying Club by Imperial Airways, Ltd., S.A.B.E.N.A., the Deutsch Luft Hansa, and the British Air Navigation Company, upon the production of certificates of membership, to be obtained from the Secretary.

NORTHAMPTONSHIRE AERO CLUB

Flying times for the week totalled 16 hr. Two new flying members joined on Sunday and started instruction; they were Mr. Charles Bennett, the playwright, and Miss Faith Bennett, the actress. The Cannibals' Party was a great success, and another, on different lines, will be held shortly.

YORKSHIRE AEROPLANE CLUB

About 18 hr. flying was done during the past week, including flights to London and back. Mr. W. Gairdner visited the Club on January 26 and 27 in a "Leopard Moth" for demonstration purposes. Mr. R. E. Beanlands' "Moth" has been purchased by Mr. W. Adams. Both are members of the Yorkshire Club.

LIVERPOOL AND DISTRICT AERO CLUB

Flying returns for the week ending Friday, February 2, totalled 13 hr. 20 min. dual and 10 hr. 25 min. solo; the times for the month of January totalled 103 hr. 15 min.

CARDIFF AEROPLANE CLUB

Flying times for the past week amounted to 4 hr. 5 min. dual, 5 hr. 10 min. solo and 30 min. tests. Mr. H. L. Armstrong has obtained an "A" licence.

READING AERO CLUB

The School has again been very busy. Messrs. Sanders, Bishop, Ogilvie and Lehmann did cross-country flights to Portsmouth. "Hawk" deliveries have been speeded up and it is now a case of definite delivery three weeks after orders being placed. One "Hawk" was shipped to India during the week, and Mr. Hill returned with his to Ireland. The next Reading Aero Club dance will be held on Saturday, February 17; this will be a "Pirates" dance with pirates' costumes or evening dress.

BRISTOL AND WESSEX AEROPLANE CLUB

During the month of January the Club flew 99 hr. 50 min., an increase of 52 hr. over the previous January. A Director's dinner will be held at clubhouse on Friday, February 9, at which the guests of the evening will be the President of the Club, Lord Apsley, and Mr. Herbert Thomas, the President of the S.B.A.C. On the following Friday, February 16, the annual Aviation Ball is being held at the Grand Spa Hotel, Clifton. An attractive cabaret programme will be included in the evening's entertainment. The Bristol branch of Airwork is again busy after a slack period during December. At present there are five machines undergoing renewal of C's of A. and three engines undergoing complete overhaul.

NORFOLK AND NORWICH AERO CLUB

The Club are pleased to welcome back Mrs. F. Crossley, who has returned to complete her training for a licence. She did a very fine first solo after only 7 hr. 40 min. dual. Mr. R. T. W. Ketton-Cremmer also received instruction, and solo flights were done by Messrs. A. R. Cox, A. Kirkby, R. Forestier-Walker and A. J. S. Morris. The second of the Visitors' Nights was held on Thursday, February 1, and was well attended. During the week several members of the company playing at the Theatre Royal visited the Club and had joyrides. The annual dinner and dance will be held at the Arlington Rooms on

Friday, March 2, and Percy Cohen's Band has been engaged for the occasion. Tickets can be obtained from the Club Secretary, price 12s. 6d. each.

LONDON GLIDING CLUB

On Saturday, January 27, the soaring conditions were feeble in the afternoon, barely permitting the *Kassel* two-seater and *Scud II* to hold their height. But, as a rain-storm approached, vigorous up-currents were suddenly set up, to the benefit of both machines. The *Kassel*, with full load, felt her way from one upheaval to another until she was soaring at a good height half a mile in front of the hill. After the rain had passed by the lift faded away again.

On Sunday, January 28, there was a trifling air from the N.W. In the morning there was elementary instruction in the foot hills. In the afternoon the *Prüfling*, R.F.D., *Kassel 20*, *Hols der Teufel* and *Crested Wren* went hard at it from the hill top until dark. Once more the *Crested Wren*, by delaying her descents, showed the value of quick-acting controls, which allow a machine to hunt out every trace of up-current close against the hill side. This veteran little machine was designed and built without the assistance of a mathematician or draughtsman.

IRISH AERO CLUB

The total flying time of the aircraft of the Irish Aero Club during 1933 was 827 hours; this included two tours of the Free State with Sir Alan Cobham's "circus." Unfortunately, two machines were written off during the year owing to crashes, and one new machine has been purchased. A number of new members were enrolled last year and the financial position of the Club improved, while a new branch was formed at Sligo and another will shortly be inaugurated at Waterford. A sub-committee has been appointed to form a gliding section under the charge of Mr. F. Peirse, and auto-towing is to be undertaken during the summer. The annual meeting of the Club will take place during this month.

JOHANNESBURG AERONAUTICAL ASSOCIATION

The week ending December 31 was an uneventful one, beyond the fact that much of the weather was extremely bad, with low-lying clouds and heavy rain. There was, of course, no flying on Christmas Day, but 48 hr. 50 min. were flown during the week. Two cross-country flights were done to Harrismith and Bulawayo. Blind flying totalled 4 hr. 20 min. The year 1933 saw two records broken, and an increase of solo hours over the total of the previous year. Dual for 1933 totalled 543 hr. 50 min. compared with 345 hr. 55 min. given during 1932. Cross-country flights totalled 710 hr. 55 min. compared with 494 hr. 55 min. of the previous year. The year's total solo hours was 972 hr. 30 min.

The drought which has recently blighted South Africa and been the cause of death of hundreds of thousands of sheep and cattle has broken with a succession of the most appalling floods, which have been bursting dams, sweeping away bridges, and inundating huge areas of the flat Free State. Motorists along the main roads have been marooned, and on one occasion a party of motorists were isolated on a small hummock in the midst of a howling torrent of water which covered the veld for miles. Their plight was genuinely dangerous, and Mr. Stanley Pearce, a member of the London Aeroplane Club, who flew out here some months ago, went to their rescue with supplies of food and tobacco, as they were inaccessible by land, and there are few boats on the Free State plateau. His action averted a tragedy, and created a good deal of comment in the South African Press. With good weather during the week ending January 7, the Club pursued a humdrum existence with 59 hr. 50 min. flying time, of which 3 hr. 20 min. was blind and 12 hr. 55 min. solo. There was also one very long cross-country flight of over 1,500 miles, from Johannesburg to East London and then to Salisbury, in Rhodesia, on an urgency errand in heavy wind.

Air Ministry appointments

THE Air Ministry announces the following appointments, to take effect on the retirement on April 1, 1934, of Sir Sigmund Dannreuther, C.B., Deputy Secretary of the Air Ministry:—

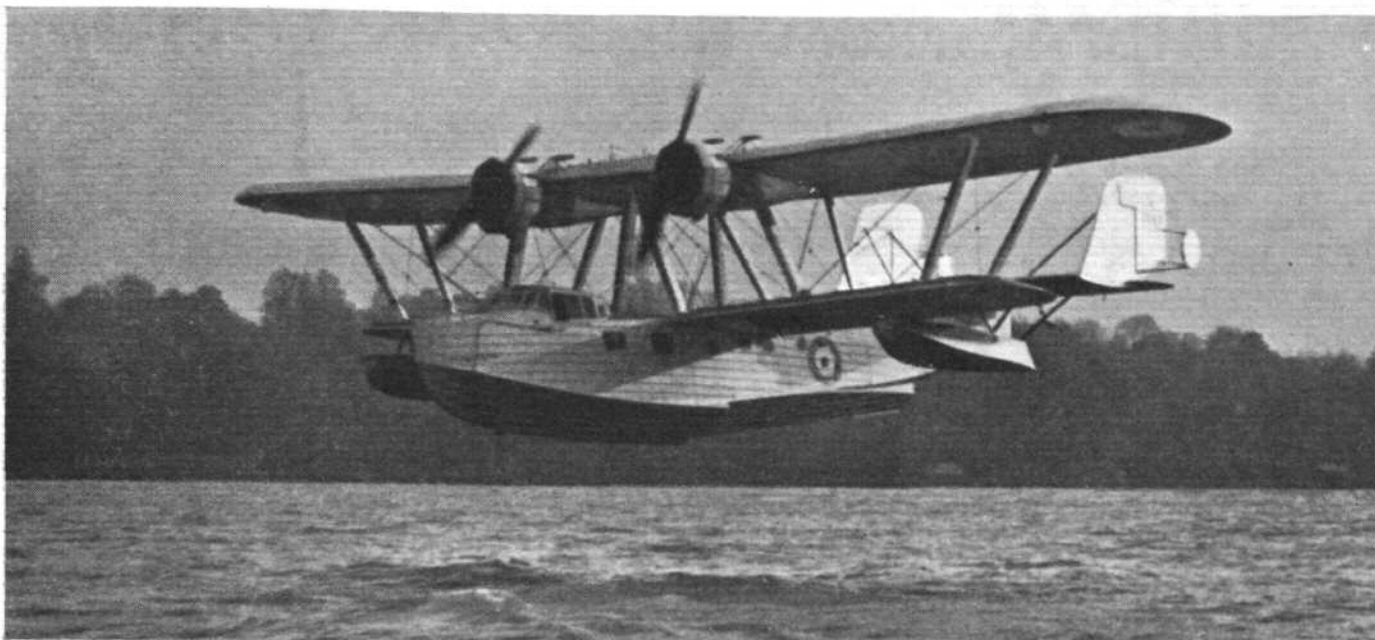
Mr. J. S. Ross, C.B., C.B.E., a Principal Assistant Secretary, to be Deputy Secretary of the Air Ministry.

Mr. J. M. Spaight, C.B.E., Director of Accounts, to be a Principal Assistant Secretary, *vice* Mr. Ross.

Mr. H. W. Clothier, Deputy Director for Stores Accounts, to be Director of Accounts, *vice* Mr. Spaight.

British air tourist in Sardinia

MR. GUY ROBSON recently made a forced landing in Sardinia, and he reports the exceptional help rendered to him by Col. Cibrelli at the Cagliari Aerodrome, and Mr. Enrico Pernis, the British Consul, who undertook the whole of the dismantling and shipping of the aircraft. The Royal Aero Club has sent a letter of appreciation on behalf of English Air Tourists to these gentlemen.



A NEW SARO FLYING BOAT

2 Bristol "Pegasus" Engines

TO the "family" of flying boats designed and built by Saunders-Roe, Ltd., of East Cowes, Isle of Wight, has quite recently been added yet another, identified for the present as the 24/31. This boat is an all-metal production incorporating the Saro features which have proved so successful in previous machines. The hull plating shows the usual fore-and-aft corrugations with which one has become familiar in the "Clouds," "Windhovers" and "Cutty Sark." The machine is, however, a biplane, resembling somewhat an earlier type of service flying boat, the A.7, but incorporating the experience which the firm has accumulated since the designing and building of that machine.

As the Saro 24/31 has been built for the Air Ministry, and is a military type, no performance figures may be given, but it is thought that long non-stop flights from one base to another in the British Empire are among the objects for which the machine was designed.

The very excellent photograph, taken by Mr. Beken of Cowes, which we publish on this page, shows that the Saro 24/31 has its two Bristol "Pegasus" engines mounted close under the top plane in a position where the airscrews are as far removed from spray as possible.

The hull shows the usual flat, tumble-home sides of Saro boats, and the underwater portion has two steps of pronounced straight-vee formation. Lateral stability on the water is ensured by wing-tip floats. The flat-sided hull is very roomy and provides comfortable living accommodation for the crew. The machine has been designed to operate as a self-contained unit and carries its own dinghy and anchoring gear. Access to the interior of the hull is through a door in the side, so that the operation of boarding the machine while it is at moorings is greatly facilitated.

Ahead of the wings, and sheltered by a raised roof with windows of unbreakable glass, is the pilot's compartment, from which a good forward view is obtained, while the engines can always be seen from the compartment.

The tail consists of a monoplane tailplane and elevator, and of two fins and rudders, placed at the extreme ends of the horizontal tailplane. The rudders have horn balances and are operated by servo rudders carried on outriggers.

No performance figures may be published, but it is permissible to state that the gross weight of the machine is a little over 8 tons.



Films of interest

SOME cinematograph films, of both importance and great interest, were shown before the members of the Royal Aero Club on Tuesday, January 30. The display was one of those periodically organised for the entertainment of members. The first was a collection of unshown aviation shots, kindly lent by the Movietone News and presented by Mr. R. L. Preston. We noticed several gentlemen well known in insurance circles looking somewhat white about the "gills," and we were not surprised, because the films were for the most part a collection of moving pictures (moving, in more senses than one!) of crashes. These had, however, their educative value and, from an aircraft designer's point of view alone, were well worth seeing. It is not often, for example, that anything quite so amusing is seen as the picture of an enthusiast pedalling hard in an endeavour to raise a contraption with eight or nine wings from the ground, only to suffer eclipse when all the wings folded up over his head. The second series of films were the results of a large amount of labour on the part of Mr. W. E. Johns, who had unearthed quantities of film from the deep recesses and proverbial pigeon holes of the War Office and Air Ministry. Johns had pieced these together, thus forming a unique and altogether extremely interesting record of flying during the war years. The first thing which

struck us was the high standard of the photography. It was hard to believe that we were seeing films taken some 16 or 17 years ago, especially when the great increase in technical filming knowledge is considered. Johns showed this film at the Schoolboys' Exhibition and found, as a result, that many ex R.N.A.S. and R.F.C. officers came to him to tell him about points in the film which they recognised. He has, therefore, been able to piece together the whole thing and so to deal with it as it is now shown. It makes an admirable record of a large part of the war period and will gladden the hearts of those who like "reminiscing." Finally, through the great courtesy of the K.L.M., the members were shown a film of the Amsterdam to Batavia route. This was for the most part taken as propaganda to show the type of country and the scenes through which a traveller over the route passes. The K.L.M. not only lent the Club the film, but also arranged for Mr. C. Kauffmann, their London Manager, to attend and explain it. An arrangement which was much appreciated.

No. 10 Sq., R.F.C. (R.A.F.), reunion dinner

No. 10 SQUADRON, R.F.C. (R.A.F.), will hold their Seventh Annual Reunion Dinner (all ranks) in London on Saturday, February 24. Tickets, 5s. 6d., from A. F. Williams, "Rozel," Amersham, Bucks.

AIRISMS FROM THE FOUR WINDS

A tragic record

On January 30 the Soviet balloon, *Osoaviakhim Syrius*, set up a new world's altitude record. The crew consisted of M. Fedoseenko, M. Vasenco and M. Usyskin, all of whom were killed when the balloon was wrecked during the descent from the record flight. The commission, which is investigating the cause of the accident, reports that it has found records which establish that the balloon reached an altitude of nearly 13½ miles. The balloon had been constructed at Leningrad under the auspices of the Osoaviakhim Society for Aviation and Chemical Warfare, and for the purpose of the record-breaking flight had an endurance, including ascent and descent, of about 10 hr. It was nearly 177 ft. in diameter, had a capacity of 25,000 m³, and the total weight, including instruments, was 2,000 kg. Fine lead shot was used for ballast. It is reported that the balloon began its ascent from Matilovo, near Moscow, early in the morning, and by 11.45 a.m. had reached an altitude of 12.8 miles. Wireless communication was maintained until after the balloon had commenced its descent, the last report being received at 3.40 p.m. (G.M.T.), after which grave anxiety was felt for the occupants. An official announcement regarding the crash states that between 3.30 p.m. and 5 p.m. the gondola was found, torn away from the balloon, near the village of Potijsky Ostrog. The envelope, which had been severed owing to the shock, had been blown away. The bodies of the three occupants were discovered in the gondola. According to the accounts of eye witnesses, the tragedy occurred during the fall of the balloon, at the same time the envelope was torn away and two explosions were heard. M. Vasenco's watch showed 4.23, which was presumably the moment of impact. The Commission of Inquiry found that the disaster was "due to excessive acceleration, due to the velocity of the stratostat's descent from a height of 12,000 m. (7½ miles). This evidently resulted in the snapping of some of the trusses, which destroyed the equilibrium of the stratostat and caused the severance of the gondola from the balloon." On February 2 the victims of the disaster were buried in Moscow with full military honours.

Soviet air expedition to Pechora

A SOVIET air expedition to determine the timber resources of Pechora, on the coast of the Arctic Ocean, has successfully completed its work. It carried out a flight of about 44,000 miles in 700 hours without a single accident. The work included a survey from the air of seven million hectares of forest land, the taking of photographs from the air, the mapping of rivers, and the exploration of agricultural possibilities and facilities for the transportation of timber.

Repair shops on aeroplanes

"ELECTRIC POWER TRUST" of the Urals is instituting a system of repair shops on aeroplanes for the repair of defects in transmission lines. Three aeroplanes are already being equipped for the purpose and landing places have been chosen. The rapidity with which an aeroplane can be sent to any point of breakdown on the transmission lines will, it is claimed, ensure a high level of efficiency. At the beginning of the summer season the machines will make regular flights on the lines of Perm-Chusovaya, Glubakha-Berezniki, Chusovaya-Tagil, Berezniki-Solikamsk.

A new Hispano

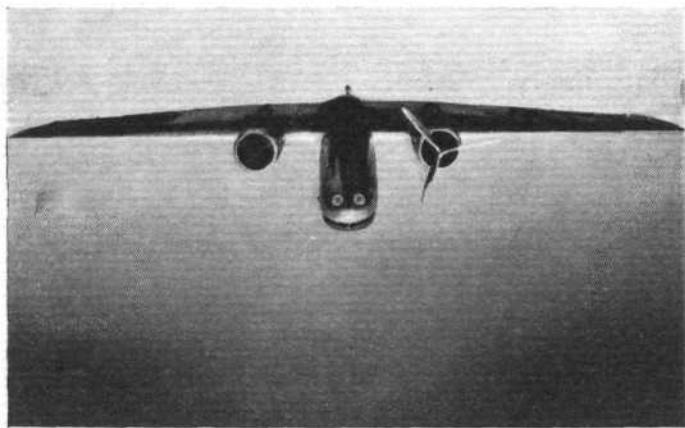
THE new Hispano-Suiza 14 Ha had its first test-run recently. It is a double-row, 14-cylinder, radial air-cooled, and on its first test is reported to have developed 960 b.h.p. at 1,700 r.p.m. The new engine is designed for a normal speed of 1,900 r.p.m.

A 6-cylinder Renault

At the Renault works in France they are developing a new 6-cylinder inverted engine of 9½ litres capacity. There is some talk of putting it into one of 1933 Coupe Deutsch Caudrons for an attempt on the light-plane speed record.

The "Bizerte" at St. Raphael

THE three-engined Breguet flying boat *Bizerte* (3 Gnome-Rhone "K. 14" engines) was flown from Le Havre to St. Raphael on January 23. The flight occupied 5½ hr., giving an average speed of a little over 100 m.p.h. The machine, in the design of which one can trace Short influence, was piloted by Lantz and Costes, and on board were also M. de la Bruyere, the engineer Laubeuf, and two mechanics. The service trials of the machine are being carried out at St. Raphael.



THE LOCH NESS MONSTER? Not at all. If the reader will turn the picture the other way up he will see a front view of the new Douglas DC-1 "Transport," a twin-engined (Wright "Cyclone" or Pratt & Whitney "Hornet") 14-18-seater low-wing monoplane, with retractable undercarriage.

"Croix de Sud" back in Africa

Croix de Sud, the French seaplane, arrived back at Saint Louis on Wednesday, January 31. It has thus accomplished a double crossing of the South Atlantic. The return flight took 21 hr. 29 min., and was the first west-to-east crossing of the South Atlantic to be made by a seaplane.

Gold medal for Mrs. Lindbergh

THE National Geographic Society of New York has awarded the Hubbard gold medal to Mrs. Lindbergh in recognition of her flight with her husband as wireless operator, navigator and co-pilot.

Mittelholtzer off to Abyssinia

LT. WALTER MITTELHOLTZER has left Zurich for Abyssinia in a Fokker which he is delivering to the Abyssinian Government. He is accompanied by several cinema operators.

A Leopard in Iraq

SIR FRANCIS HUMPHRYS, the British Ambassador in Iraq, has purchased a D.H. "Leopard Moth," which left Heston on Wednesday morning, January 31, piloted by Flt. Lt. Hawkins, on its delivery flight to Baghdad.

To a rugger match by air

EIGHT miners from Tylorstown, South Wales, decided to travel by air to see Wales play their annual Rugger match against Scotland at Murrayfields on Saturday, February 3. Unfortunately, the machine which was transporting them north ran into fog near Stafford, which prevented any further progress towards Scotland. Determined to get their money's worth, the eight miners decided to fly to Portsmouth and see the Portsmouth-Sheffield United Soccer match. This they did, and after a night at Portsmouth flew back to South Wales, no doubt cheered by their country's magnificent victory in Scotland.

Miss Joan Page married

MISS JOAN PAGE, who at the beginning of last year crashed in the bush while flying out to South Africa with Miss Sale-Barker, was married to Mr. R. D'A. L. White on January 25.

Vickers Machines for New Zealand

A BATCH of Vickers "Vildebeeste" Torpedo Bombers have been ordered by the Government of New Zealand for delivery about the middle of the year. They are equipped with Bristol "Pegasus" engines. This is presumably part of Mr. Forbes' reorganisation of the New Zealand defence system, which he announced last October.

England-Australia race

THE Government of India has decided to render financial assistance to Indian pilots who wish to enter for the England-Australia race. Two Indian pilots have expressed their desire to take part in the race, Mr. P. P. Nazir and Pilot Officer Aspy, engineer. To make it possible for them to participate in the race a guarantee fund of £5,500 has to be raised by the end of February, and towards this £500 has already been contributed.

Mr. Walter Wellman

On January 31, the death took place in New York of Mr. Walter Wellman at the age of 75. Mr. Wellman was

an American journalist who embarked upon several aeronautical hazards previous to the Great War. At the beginning of the present century he began to interest himself in airships, and in the year 1906 built an airship with a capacity of 224,000 cu. ft. and powered by two engines of 55 h.p. and 25 h.p. It was called the *America*. The first trial was a disappointment, and the airship was rebuilt. A flight to the Pole was started on September 2, 1907, but fog and a defective compass brought the project to an end three hours after it had begun. Wellman, however, was not dismayed, and on August 15, 1909, he made another attempt in an improved airship. This second attempt was also unsuccessful, and, after being towed home by a Norwegian steamer, the airship was wrecked in a squall. His last attempt to prove the value of the airship was in 1910, when an attempt was made to fly the North Atlantic. Setting out from Atlantic City on October 15, Wellman, with five companions, headed east across the ocean. Unfortunately, the airship was blown out of its course and abandoned 400 miles off Cape Hatteras. The crew were picked up by the Royal Mail Steamship *Trent*. The airship had covered over 1,000 miles, and, what is worthy of note, carried wireless, this being the first occasion on which wireless messages were transmitted from the air.

Aeroplane over London

A LOT of unnecessary fuss was caused last week by a machine being sighted flying in a circle over London. Actually it was only a "Virginia" engaged in the official duty of giving an anti-aircraft unit location practice.

Cables again

ANOTHER case has occurred of an aeroplane hitting electric cables, this time in Devon. Mr. Thomas Nash, with eight members of the Barnstaple Flying Club, after doing a circular tour, was compelled, by lack of petrol and approaching dusk, to land. On the way down the machine hit some electric cables, but, fortunately, with not enough damage to wreck it. The pilot and passengers all escaped, and no serious harm was done to the machine.

An economical aeroplane

OUR readers will remember during the latter end of last year that the Vacuum Oil Co. sent a "Dragon" (two "Gipsy Majors"), piloted by Mr. H. J. White, to survey a large portion of the England-Australia air route in the interests of that company and their associated marketers. The "Dragon" was away 56 days, during which time it put in 340 hours' flying. Apart from one exhaust valve joint, not one of the spares carried was used at all, and barring the shedding of a wheel spat between Benghazi and Cairo the complete absence of trouble enabled Mr. White to devote his whole time to business. A careful record of the fuel and oil consumption shows that the former was 5.6 gall. per engine hour and that the latter was 1.522 pints per engine per hour of Mobiloil Aero "W," a particularly good figure when it is realised that it includes regular draining at specified intervals.

A new "Hawk"

PHILLIPS & POWIS AIRCRAFT (READING), LTD., have just produced a three-seater joy-riding "Hawk." This machine is said to have an exceptional performance and should be of great interest to all firms using joy-riding machines.

New registrations

AMONG the new aircraft to be registered are "Leopard Moths" for Mr. W. Lindsay Everard, Mr. Loel Guinness and Mr. F. H. Matusch. Besides the Miles "Hawk" belonging to Man Mohan Singh, the beginning and end of which we have already reported in FLIGHT, there is another "Hawk" registered in the name of Mr. F. R. Hill, of Dublin. Two "Dragons" are also registered to Mr. W. L. Thurgood.

Mr. John Grierson's wireless demonstration flight

FLYING his well-known "Gipsy Moth" aeroplane, *Rouge et Noir* (G-AAJP), Mr. John Grierson left Brooklands Aerodrome on January 27 on a flying tour through Europe to demonstrate the Marconi "homing" device as an aid to air navigation. This equipment—which has already been described in FLIGHT—enables a pilot to make a direct course for any wireless transmitting station which lies on his route and gives immediate indication of any deviation. Mr. Grierson had considerable experience in the operation of the "homing" device on his flight to Reykjavik last summer, when he carried no other wireless apparatus. For his present demonstration tour he is using the same D.H. "Moth" as on that flight, but a wheeled undercarriage has been fitted in place of the floats fitted for that journey over the sea. Arrangements have also been made for skis to be substituted for the wheels, if necessary, on account of snow at this time of the year in Poland and Roumania. The tour is expected to take about three weeks, the proposed route being Brussels, Amsterdam, Hanover, Berlin, Prague, Warsaw, Buczarest, Belgrade, Budapest, Vienna, Munich, Stuttgart, and Lympe.

The too-cheap "Puss Moth"

IN the Phillips & Powis advertisement on page xx of last week's issue the price of a "Puss Moth" was given, owing to a printer's error, as £250. Not unnaturally, Phillips & Powis had numerous inquiries at this low figure. The price should have read £550. We apologise for any inconvenience which the misprint may have caused.

Irish town planning

AMONGST a number of amendments which architectural associations are proposing to the Free State Government for inclusion in the Town Planning Bill, now before the Dail of that country, is one to provide for the specific mention in the Act of the right of local authorities to reserve sites for municipal aerodromes in their town-planning schemes. In official circles it is considered that the amendment will be accepted.

An airport for Clacton

AT the Annual Dinner and Dance of the Clacton Chamber of Commerce, held at Clacton Town Hall, on Wednesday, January 31, the necessity of an airport for the town was emphasised. The President, Mr. S. A. Gallant, expressed his opinion that the flying ground to the west of the town could be made into a great asset for the town, and should be under the control of the Council before development in that direction made the use of the ground for aircraft both difficult and dangerous. He suggested that the Council should look ahead and visualise Clacton as an airport with regular services to Holland. The future development of Clacton was bound up with an exploration of the possibilities of air travel.



SUMMER AIR SERVICES IN WINTER: Members of the International Air Traffic Association, who were in conference in Berlin last week to discuss the summer time-tables for European air services, are here seen at Templehof airport.

AIRPORT NEWS

CROYDON

AN announcement following a recent conference in Berlin between the heads of all the European air traffic companies foreshadows a busy summer at the Airport of London. It is to the effect that 150 cities of Europe will be linked with Croydon by air lines during the 1934 season.

Owing to the disturbed state of the gold market, large consignments of bullion passed through the Airport during the week. The total was in the region of six tons, valued at approximately one and a half million pounds. Both K.L.M. and Sabena ran "gold specials" and the former company sent one fully-loaded bullion aeroplane off from Amsterdam at daybreak one morning. It cleared Customs inward at Lympne and flew straight to Southampton to catch a boat for America.

Another interesting cargo shipped from Croydon was a complete private Zoo, consisting of wallabies, Tasmanian devils, mountain sheep, monkeys, a wild cat, kangaroo rats, vultures, owls, bush turkeys, doves, pigeons, and jays. This ark-load of air passengers left Croydon by D.L.H. night mail for Berlin via Cologne and thence by another service to Vienna. The creatures were fed before leaving London and had not to be fed again until they reached their destination.

Two of Imperial Airways, Ltd., "trainees" have passed out of the company's training school after a three years' course in all branches of the air traffic business. They are Mr. Manton, who has gone to Salisbury (Africa) as station officer, and Mr. Stuart-Shaw, who has been appointed to a similar position at Nairobi.

Air travel is a pudding which is continually proving itself in the eating. Mr. R. D. Solloway, of Smithfield, proved its palatability to his great satisfaction last week. Called urgently to Paris by cable one morning, he arrived at Croydon just in time for the 9.30 a.m. Imperial Airways departure. Reaching Le Bourget at 12.0 noon, he was greeted on the tarmac by his business friend, and after half-an-hour's conversation over a cup of coffee he stepped aboard the 12.30 p.m. return machine for Croydon, which was reached at 2.45 p.m. By 3.30 p.m. he was back in his Smithfield office, having put through a highly successful business deal in France.

People who grumble that there are no jobs going for pilots in British aviation should remember that the properly trained man gets the jobs. Mr. G. N. Beckman, the first pupil to complete the long course with Air Service Training, Ltd., Hamble, was recently appointed a first officer with Imperial Airways, Ltd. The course at Hamble is specially designed for men desiring to take up commercial flying seriously.

Last Tuesday that admirable function, the annual Croydon Airport dinner, was held at the Greyhound Hotel, Croydon. A full report of this dinner is given below.

Another notable Croydon event was the football match between Imperial Airways, Ltd., and "Odds and Ends," which was rather surprisingly won by the latter 6-3. It is hoped that Imperial Airways will challenge for a return match. Despite a muddy ball and clogged boots, it was a good game, keenly contested. Goals were scored for the "Odds and Ends" by Humphries of K.L.M., Ward of the Meteorological service, and Roque, of Air-France. For Imperial Airways, Morton and Venner were the scorers.

A K.L.M. passenger, who has probably beaten all records for her age in unaccompanied flight, came in to Croydon last week from Copenhagen by the K.L.M./A.B.A. Scandinavian Air Express. She was Miss Cook, aged 4, who some months ago made the outward journey alone in the same way. It is a pity Miss Cook cannot be persuaded to lecture to some of our ultra-conservative business men who are scared of air travel, even though accompanied by their secretary and valet.

In this connection there is a story of a director in a distant city who wired his assistant not to come from London by air on account of the alleged uncertainty of air travel. On the machine by which the assistant should have travelled was a letter from the Croydon representative to his colleague explaining the situation. The representative in the far city was able to call upon the director and convince him of the error of his ideas about air travel. Some considerable time later the assistant arrived in a haggard and storm-tossed condition, to be informed that in future he was to travel by air and not waste time on the boat.

A. VIATOR.

HESTON

THE proprietors of the *Morning Post* have agreed to hand over the trophy and title in the "Morning Post Cross-Country Race" to Airwork, Ltd., who have undertaken to organise and finance the contest in its new form, renamed "Heston Air Navigation Trials, 1934," and to draw up the rules in a form which will make it unnecessary for competitors to fly with engines at full throttle. The date has been fixed for Saturday, May 26.

An extension to the stores is being built on to the south side of the Service hangar. A special feature is the provision of serving hatches designed to admit different classes of materials, one of which has doors large enough to allow of the passage of complete wings of aircraft.

A new hangar is going up east of the three lock-up hangars, and has, in common with the existing Service hangar, an unsupported span of 100 ft. The depth is, however, 130 ft., as compared with the 80 ft. of the Service hangar, and the total area of 13,000 sq. ft. is unobstructed by lock-ups. The entrance doors will open to a width of 80 ft., and aircraft of slightly larger span may, of course, be inserted at a small angle. The hangar will be roofed with asbestos, with corrugated iron walls and a floor of reinforced concrete. Ring bolts ingeniously placed to combine into most of the usual aircraft spans will be placed on the tarmac outside, to eliminate the need for wheeling aeroplanes out into the exposed grass landing area to be pegged down.

Mr. W. Lindsay Everard, who landed at Heston on Wednesday, January 31, on his way from an Airport Conference in Leicestershire to an Air Ministry meeting in London, is the owner of a "Leopard Moth" which is coming in for the fitting of "Airwork wheel fairings." Airwork designed and manufactured their forerunners on the "Puss," and have modified them for the "Leopard."

School flying hours, reported last week as 100 per cent. up on January, 1932, show at the end of the month that the actual increase figure is over 200 per cent. Last week's statement was only a rough estimate, which now proves to have been too modest by half.

THE CROYDON AIRPORT DINNER

AVISITOR to the Airport of London on the night of January 30 might have noticed that the members of the staff then on duty paused, now and then, in the pursuit of their allotted tasks and, assuming an expression reminiscent of that worn by a pantomime Cinderella after the exit of her two sisters, would gaze out into the darkness over Purley Way at the twinkling lights of Croydon town. They were not, as might be supposed, waiting the arrival of an erring aviator, but were wondering how the Annual Dinner, Cabaret and Dance

organised by the Croydon Airport Social Committee at the Greyhound Theatre was proceeding. We can assure these unfortunates that the affair was a great success, and, although Maj. L. F. Richard, the chairman, expressed his disappointment at the number present, contingents of visitors from as far afield as Lympne and Bristol settled any question of the popularity of the dinner.

The menu we found quite amusing, each course on the card being headed by the following captions: "take off," "your bearing is," "getting bumpy," "visibility bad,"

and "zone control in force." Incidentally, the zone control proved a popular topic for conversation.

MAJ. MEALING, in proposing the toast of "All Firms and Operating Companies," said that he often wondered who owns Croydon Aerodrome—Imperial Airways or the Air Ministry? He complimented the organisers of the dinner, and said it was an occasion where people could tell each other what they thought and get to know each other. Maj. Mealing asked the operating firms at Croydon to keep the Air Ministry informed of their troubles. On this remark there was an immediate show of hands by several operators. Operating Companies, said Maj. Mealing, were welcomed to Croydon, even if the charges were high.

MR. EMILE BOUDERIE, aerodrome manager for Air-France at Croydon, responding to the toast, proposed by Maj. Mealing, said that the Press kept everyone informed of what was happening in aviation. He recalled the old days at Hounslow and spoke of the machines which carried one or two passengers and perhaps two parcels, comparing them with such machines as those which operate services to Batavia and India. Australia may soon be included in the list, and perhaps this year, or perhaps next, South America as well.

MR. "JOE" CHAMBERLAIN, in proposing the toast of the ladies, said he was not a lady's man. A speech, he said, should be like a lady's dress—short enough to be entertaining and long enough to cover the subject.

MRS. LEVERTON recalled the Croydon of thirteen or fourteen years ago, and expressed her pleasure at seeing at the dinner many friends of the early days.

MR. L. PACE proposed the toast of the visitors, and expressed his pleasure at the presence of many from Bristol and Lympne.

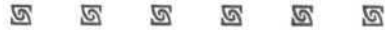
COM. DEACON, who was at one time second in command at Croydon, and is now in charge of Lympne aerodrome, responded on behalf of the visitors. He did not, he said,

feel like a visitor with so many familiar faces round him. All the traffic staff of Lympne who were off duty were present at the dinner.

MR. "CY." HOLMES, another old Croydon pilot, now at Bristol, referred to Capt. O. P. Jones as an old pupil of his, whom he had taught cross-country flying. Mr. Holmes said he had not been to Croydon for 10½ years and, on arriving there by air, was surprised to see what he called a lot of "red things" through the fog. In the old days, he said, pilots arrived by Grace of God. He referred to the way in which Croydon will persist in butting in on the Heston wireless weather reports. He admitted that Croydon to-day is marvellous; ten years ago, he said, it was wonderful.

MR. G. W. THOMPSON proposed the toast of the chairman, including in the toast the name of Mrs. Richard. As a member of Maj. Richard's staff, it seemed that he was compelled to say "nice things." Having had the honour of serving under Maj. Richard for many years, he was in a position to judge him. Maj. Richard's position was not to be envied, for he was in charge of a government department which worked alongside private enterprise.

MAJ. L. F. RICHARD, in replying, said that the kind things which Mr. Thompson had said applied to the staff in general. He was a little disappointed, he confessed, that there were not many more present at the dinner. He expected an increase in the number of passengers, and thought that a figure of 100,000 passengers a month was not beyond hope. In referring to the new zone control system, Maj. Richard complimented the pilots for their co-operation in the scheme. If they had failed, he said, the whole scheme would have dropped to the ground. He congratulated also the Duty Officers and the Wireless Staff. The system was not yet complete, as it was too much to expect that such a scheme could be finished at the first attempt.



ENGINE COWLING

With Special Reference to the Air-Cooled Engine

By J. D. NORTH, F.R.Ae.S., M.I.Ae.E.

Lecture, abridged, delivered before the Royal Aeronautical Society on Thursday, February 1, 1934.

IN the earliest stages of the development of the aeroplane successful flight depended on the achievement, rather of minimum weight, minimum wing loading and maximum engine power, than on minimum parasite resistance. At a very early date the rotary Gnome engine achieved a predominant position amongst aeroplane power plants. In the early Farman and similar machines with engines at the rear, even oil guards were often not used, but as the tractor became normal, cowling was adopted. Such cowling consisted of a sheet metal hood, which either completely surrounded the engine or which extended some 270 deg. round the engine, this hood being continuous with the fuselage surface at least over the upper part of that surface, and permitting the escape of exhaust gases, of cooling air, and of oil, only towards the lower part of the fuselage.

Apart from rotary engines, the only air-cooled engine of pre-war days which used cowling was the eight-cylinder Vee Renault. The cowling, provided by the makers, was essentially a system of air ducts through which cooling air was drawn by a fan, and the cowling was essentially a cooling device, not a resistance reducer. It is interesting that neither in the rotary nor in the Renault did cooling depend to more than a limited extent on the speed of flight of the aircraft, the rotation of the cylinders in the one case, and the fan in the other, providing the relative motion of air and cylinders required.

It is also interesting to note the high proportion of engine power absorbed in rotating the cylinders of the rotary engine and thus ensuring cooling. Speaking from memory, the reaction torque of the nominal 50-h.p. Gnome corresponded to the 50-h.p. rating, the h.p. available was about 37 h.p., some 13 h.p., or 26 per cent. of the power developed in the engine, being used up in rotating the engine.

In early water-cooled engine installations, it was the

custom to leave the cylinders exposed, and to use radiators mounted clear of the engine, not influencing the form of such cowling as was used. At a later date radiators mounted ahead of the engine, forming the front end of a cowling, as, for example, in the S.E.5, or larger radiators behind the engine, as in the R.E.7, came into fashion. The practice of leaving water-cooled cylinders exposed to the air persisted on the assumption that some direct heat dissipation from the jacket walls was obtainable. Modern water-cooled engines are normally cowed completely, and radiators retractable within the fuselage or more or less shielded from the free air stream, are usually employed. The cowling has become merely a case designed to cause the minimum resistance.

Cowling of Air-Cooled Engines

Although the cowling of air-cooled engines, even to so late a date as the end of the war, was dictated normally by considerations other than that of reducing resistance, the question of resistance was not entirely neglected. A low resistance installation is the Paulhan-Tatin monoplane (Fig. 1), designed circa 1913, in which a rotary air-cooled engine was enclosed in the body, driving an airscrew at the rear of the fuselage by a shaft.

In 1913 M. Jean Armand Deperdussin proposed means of cowling rotary engines* with a view to ensuring minimum resistance. The engine was mounted on the front bulkhead of a fuselage of circular section, and enclosed in a casing which, in conjunction with the body, formed a continuous streamline form. At the front of the cowling an aperture admitted cooling air to the engine. At the rear, louvres allowed the air to emerge.

The standard cowling used by all nations during the war for rotary engines was influenced by these patents. The cowl formed a continuation of, or was faired into the fuselage lines. The fore end was curved inwards to form a fair entry to the body lines. But it was not found

* Deperdussin. French Patents 444619, 447788 (1912).

practicable to enclose the engine completely, and a free exit for air, exhaust, and oil was provided by leaving a large gap between cowl and fuselage.

Towards the middle of the war the Salmson company, in France, introduced a cowling similar to the Deperdussin, for their radial Canton-Unne engines. The engines, though radial, were water-cooled, and fitted with annular radiators, mounted within the cowling. A similar type of cowling was later applied to Salmson air-cooled radials and by the Caudron company to Anzani radial air-cooled engines. Essentially the method of reducing drag consisted in all these cases in shielding the engine from the free air stream and in cooling by a stream of velocity considerably reduced by the cowling. The engines were all of low power and relatively large dimensions, and hence should have been easily cooled.

In a cowling with rearwardly facing air outlets surrounding a rotary engine, the engine may act as a rotary blower, inducing a rearwardly directed flow of air at high velocity, producing a measurable thrust, and effectively decreasing engine drag. The existence of this has been verified in the wind tunnel.

The demand for engines of increasing power, and the difficulties of producing stationary air-cooled cylinders of high output led towards the end of the war to an increasing use of water-cooled engines and to a partial eclipse of air-cooled type. Work on the air-cooled type continued, however, and in the ten years or so following the war, the high-powered radial air-cooled engine established itself, as being the most widely used type for both military and commercial service throughout the world. During this period radial engines were used either with no cowling or with cowling which had little effect in reducing drag. It was realised that the power wasted in driving radial engines through the air was worth saving, and as speeds and performance increased, this waste of power became important.

Fig. 2 shows an arrangement in which cowling is confined to a casing surrounding the crankcase, of a form to blend into an airscrew spinner forward, and the fuselage behind, the engine cylinders projecting out into the open. A tail is added to the cowling behind each cylinder, with the object of partly streamlining the projection. Unfortunately, the efficacy of these arrangements as drag reducers was small.

Fig. 3 shows the cowling fitted in 1923 to the Gourdou-Lesieur type C.1. Each cylinder of the "Jupiter" engine is enclosed in a separate streamline chest, with a limited aperture at the front for admission of cooling air, and an exit at the rear so that the emerging air may blend with the general air stream. The principle is similar to that of the single streamline casing enclosing the whole engine. This cowling is capable of reducing resistance substantially, but has a serious effect on the cooling of cylinders,* and has not been found practicable except possibly for very high speed aircraft.

The growing ascendancy of the air-cooled radial was for a time seriously threatened by the development in America—by the Curtiss company—of the combination of a twelve-

cylinder Vee engine of very small frontal area, complete enclosing of that engine in a cowling faired to the fuselage lines and the adoption of wing radiators.

It is well to note that "low frontal area," often applied to streamline bodies, is a misleading phrase, and that frontal area is only a measure of resistance in the case of geometrically similar solids of revolution. It was enclosing the Curtiss engine in a body of good shape and of small surface area, rather than of small cross-section which was of importance.

The last five years have seen the development in England of the Townend Ring, and in America of the original form of N.A.C.A. cowling which, when properly applied, are able to reduce the drag of a radial engine to values only a fraction of those previously attainable without prohibitive interference with cooling. There can be little doubt that to the introduction of satisfactory forms of low drag cowling, the radial air-cooled engine owes a renewed lease of life.

Engine Cooling

It will be clear from the historical outline given that the factor limiting the use of low drag cowlings is cooling. To enclose the power plant in a streamline casing was the obvious method of obtaining low resistance, and would have been adopted at a very early stage were it not for the necessity of cooling engines. The theoretical aspects of cooling have already been ably dealt with by Pye.*

By the use of the wing surface, or of some other necessary part as a cooling surface, it is possible to secure cooling without increase in the resistance of the aircraft—except in so far as the skin friction coefficient may be affected by change in temperature of the air flowing over the surface. But it has not become practicable generally to use wing or body surfaces for engine cooling, and the added resistance of special cooling surfaces must be tolerated. For any given form of cooling surface the rate of heat dissipation depends on the temperature difference between the surface and the air and on the relative velocity of air and cooling surface. It is nearly directly proportional to the temperature difference and varies as some power of the relative velocity depending on the characteristics of the cooling arrangements which is rather less than unity.

In the problem of engine cooling, as a first approximation, the temperature difference between the heat dissipating surface and the air may be regarded as having a constant value, fixed by the permissible upper limit of the boiling point of water in water-cooled engines and of permissible operating cylinder temperatures in the air-cooled case. The critical cooling condition must correspond to full throttle operation of the engine.

In service the engine will normally be opened up to full throttle for take-off with the aeroplane stationary and remain at full throttle during acceleration on the ground, during climb to operating height, and may remain at full throttle during full-speed flight.

At the start, the temperatures are substantially below their steady normal operating level, and the effective heat reservoir afforded by the power plant as a whole prevents excessive temperatures being reached during the initial period of a flight in which the air speed of the machine is very low. The condition which will determine the area of cooling surface is the heat dissipation obtainable at the minimum speed of flight which can be maintained at full throttle for any appreciable period. For practical purposes this condition is generally that of a continued climb at maximum climbing speed.

Pye's estimate of the power expended on cooling a 500-h.p. engine on an aircraft flying at 150 m.p.h. is 6.8 h.p., or about 1.5 per cent. of the engine output.

Change in fin proportions, particularly as regards pitch/height ratio have a considerable effect on heat dissipation and—apparently—appreciably affect the ratio between resistance and heat dissipation. The temperature of air-cooled cylinders varies over a wide range, for different positions on any cylinder, and it is quite impossible to estimate from available data as to maximum safe temperatures at specified positions of current types of such cylinders, whether the assumed mean temperature differences represent conditions which could be tolerated. A further uncertainty, particularly in air-cooled engines, is the proportion of total heat of combustion rejected in various ways. The overall thermal efficiency of such

* Pye, The Principle of Air Cooling, "Aircraft Engineering," Feb., March, April, 1933.



Fig. 1: Paulhan-Tatin "Torpille Aérienne" of 1912. The engine was fully enclosed in the centre of the fuselage and drove an airscrew in the tail by a shaft.

engines is easily ascertainable—the proportion of waste heat carried off by exhaust gases, by the lubricating oil, and the remainder to be dissipated mainly by the cylinders is not known, and there is evidence that the proportion of total waste heat carried off in these various ways differs widely for different types of engine.

The estimates of power required relate to heat dissipated from cylinders alone, but the resistance both of oil coolers and exhaust systems may be regarded as part of the cooling resistance, and allowance should be made for these.

Pye shows that the difference in performance of an aeroplane with a water-cooled engine and retractable radiator showed a difference in resistance, radiator exposed and radiator completely retracted, of 9 per cent. of the remaining resistance of the aircraft, the top speed of the machine being about 150 m.p.h. Presumably the radiator in question gave sufficient cooling for the engine on the climb, and if the climbing speed of machine was 75 m.p.h., and if the whole of the waste heat rejected through the cylinder walls was required to be dissipated by the radiator during climb, it should be capable of dissipating nearly twice the amount of heat required for cooling at top speed. Cooling systems sufficient to cope with climbing conditions are of excessive capacity for flight at high speeds, and tend to become increasingly excessive as the performance of aircraft increases, but increasing speed is normally attended by increased rate of climb and decreased time to reach operating height. The capacity of the heat reservoir afforded by the engine and lubricating oil, during the rise in temperature from take-off conditions to maximum permitted temperature, can therefore absorb heat at a rate inversely proportional to the time taken in climbing.

With water-cooled engines the high specific heat of water provides a very large heat reservoir, and the high latent heat of evaporation of the same fluid permits of the dissipation of heat at a greatly increased rate accompanied by a relatively small loss of water by evaporation. Thus there is an effective heat ballast system which permits a temporary rate of heat rejection in excess of the rate of dissipation from the cooling system without temperatures rising to beyond permitted limits.

Cooling systems are normally arranged in the airscrew slipstream, whose velocity is more nearly constant than the air speed of the machine itself, and the effective cooling velocity does not vary over such a wide range as the machine speed. The effect of airscrew characteristics on cooling problems is considerable. Geared airscrews of large diameter reduce the assistance to cooling given by slipstream. Behind the boss, and for some distance outward therefrom, the added velocity due to the airscrew has a negative value—which may extend over 0.2 of the whole diameter, and the increase in airscrew diameter following the use of reduction gears, with the consequent increase in the area shielded by the centre of the airscrew, is a factor of considerable importance as regards cooling of radial engines in particular.

The nature of the permissible limits of temperature of an engine installation enters into the question. There is an upper limit for cylinder heads at which mechanical failure occurs after a very short period. Below, there is a whole range of operating temperatures, each corresponding to some life between overhauls of the engine. Temperature limits are commonly determined as those which continuously maintained are consistent with a particular life between overhauls—generally 100 hours. In regular service, the attainment of these maximum permissible temperatures for a few minutes during climb, followed by a period of cruising flight at substantially lower temperatures, is found to give a service life between overhauls two to three times as long as would result from continuous operation at maximum temperature. All these factors reduce the disparity between the amount of fully-exposed cooling surface which is needed for climb and for high-speed level flight to something considerably less than would appear to be necessary on first consideration.

It is generally true that the cooling which has to be provided on an engine installation is determined by the cooling required on climb, that this cooling system provides excessive cooling capacity and consequently excessive drag at higher speeds. The importance of drag of cooling systems increases very rapidly with increase in the ratio of climbing to maximum level air speeds, since power expended on such drag varies as the cube of the speed and is graphically indicated by Fig. 4, which shows the variation in the proportion of the total drag of an aircraft

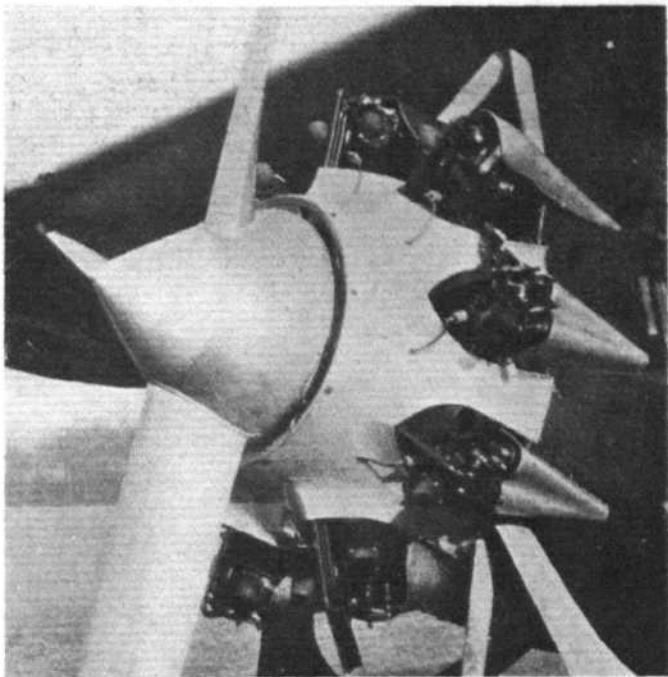


Fig. 2: Normal cowling for fixed radial air-cooled engines. The spinner, crankcase, cowl and body lines blend. The cylinders project from the cowling and have tails behind them to assist streamlining.

represented by fixed cooling systems with variation in maximum speed. Two different cases are shown, one in which the drag of the cooling system at 100 ft./sec. is 1 lb. per 20 b.h.p. (25 lb. for 500 b.h.p.), and the other in which it is 1 lb. per 7.14 b.h.p. (70 lb. for 500 b.h.p.). The figures correspond closely to a good ring-cowled radial installation and to a good radial installation with crankcase cowling only, using current types of air-cooled engines, and do not indicate the limits of possible reduction in cooling drag possible as a result of engine development or by other means. The figures do not represent the effect, on otherwise identical aircraft, of a change in cowling, as the change to low drag cowling will cause an increase in maximum speed, but indicate directly the change in power spent in cooling on aircraft designed for equal top speed, and therefore of equal total drag, the saving due to low drag cowling being used, for example, for increasing useful load or fuel.

They do indicate directly the reduction in engine power required for a given speed on such otherwise identical aircraft caused by the assumed change of power plant drag, but such reduction in the power of the engine actually installed would operate still further to reduce the drag, and consequently still larger economies in power expended would become possible. If the maximum speed of an aircraft with the higher drag cowling of the figure be 175 m.p.h., the cooling drag and h.p. will be 55 per cent. of the total. If the lower drag cowling be fitted, the engine maximum power being not altered, the maximum speed will increase to about 200 m.p.h. If, however, the aircraft with low drag cowling is operated at 175 m.p.h., the cooling drag falls to 20 per cent. of the total for the original machine at the same speed, and the power absorbed and the fuel consumption at 175 m.p.h. falls to 65 per cent. of that of the original machine. The effect on range for equal fuel, on load for equal range, and in engine reliability need only be mentioned.

Means whereby Cooling Resistance may be Reduced

Ideal cooling conditions assumed by Pye in the estimate of power necessarily absorbed in cooling, are not generally obtainable. The wing radiator for water-cooled engines is rarely practically possible. Steam cooling of the kind proposed by Wing Com. T. R. Cave-Brown-Cave many years ago, has, however, given wing surface cooling a new field of utility. The increase in the mean temperature at which heat is dissipated to actual boiling point reduces the total surface required, and permits the use of the leading edge of the wing alone, and the low density of steam—as compared to water—greatly reduces the weight of cooling fluid in

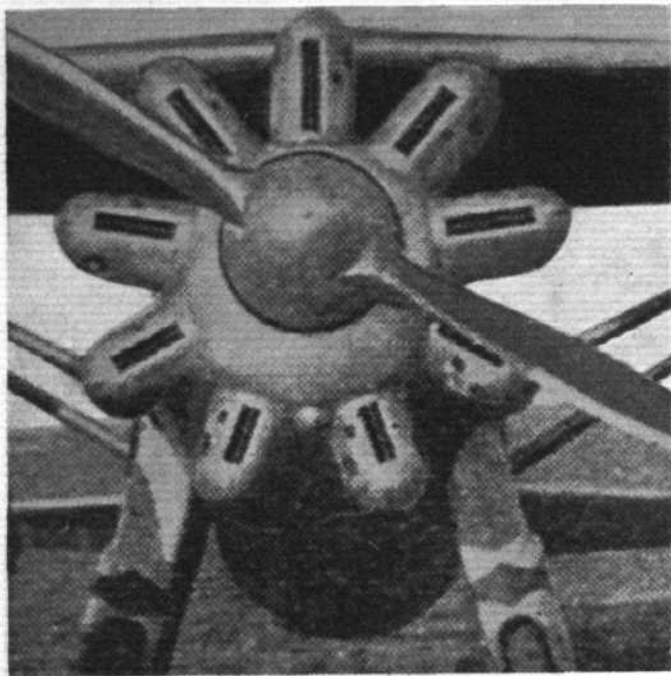


Fig. 3 : Gourdou-Leseurre fully helmeted cowling of 1923.

circulation. For the steam-cooled case, cooling, for little or no added drag, now appears to be a possibility so far as relates to the dissipation of heat from cylinder walls alone. Oil, and exhaust cooling, and the drag of air intakes remain and assume an added importance in consequence.

In the case of the air-cooled engine, the form of cooling surface is characteristic of the engine itself, and the aircraft designer has no such control over that form as is available in the liquid-cooled case, and has there resulted in the development of wing nose condensers for steam-cooled engines. As the drag of any given cooling surface increases as the square of the velocity, while heat dissipation varies at a lesser rate, cooling drag can be reduced by increasing cooling surface and so shielding the surface from the air that the air speed over the cooling surface is reduced. It should therefore pay the designer of the air-cooled engine to increase the cooling surface output ratio to enable cooling to be effected at reduced air speeds which would permit of decreasing the necessary exposure of the engine to the air by means of cowling. This has been recognised by the engine designers, who in producing new type engines have invariably aimed at providing as large a margin of cooling surface as was practicable. Development of such an engine then proceeds in the direction of progressively increasing the output per c.c. of cylinder capacity, and, with output, the heat dissipation rate needed for cooling—until finally the cooling margin originally provided disappears and redesign for improved cooling once more becomes necessary.

The fact that the net thrust h.p. available, after deducting engine drag, rather than the b.h.p. developed is a measure of the useful output of the engine, and that the capacity to cool with a low air velocity, may lead to a considerable economy both in the ratio net t.h.p.:b.h.p. and in the effective fuel economy of the engine, deserves more attention than has been given to it.

The principle of using lowered air velocities and increased cooling surfaces to reduce cooling drag is well known. Junkers has proposed radiators enclosed in casings, open to the air stream, with internal passages expanding from opening to radiator position and thereafter contracting.* The radiator is thus at a region of reduced air flow, and, for given cooling, involves lowered drag. The casing was to be given an external form conducive to low drag, and the method is undoubtedly capable of useful results. A large saving in drag by this method involves increase in dimensions and weight of radiator of substantial amount.

The helmet cowling (Fig. 3), and the enclosure of air-cooled engines in streamline cases (Deperdussin, etc., and the original N.A.C.A. cowlings), depend for their practicability on the engines possessing some excess cooling capacity, and on cooling by the use of a flow of cooling air at a

velocity less than that of the free air stream. Radiators fitted with adjustable shutters or other screening devices have been used to reduce cooling drag at high air speeds. Such arrangements may operate either by reducing the air velocity over the cooling surface, or by reducing the area of the cooling surface exposed to the free air stream during high-speed flight, or by a combination of the two. In modern low drag installations of liquid-cooled engines, the cowling is purely an engine fairing, and cooling is effected by radiators (or condensers) which are not part of the cowling. Nevertheless, the development of such low resistance cowling has been made worth while only by the development of low drag cooling organs.

In the air-cooled engine, cowling and cooling are indissolubly associated, and it is with such engines than cowling design is a matter of outstanding importance. The finned cylinder, which serves in such engines as the main cooling organ, is a body of very bad aerodynamic shape whose high resistance is mainly due to eddy making. When such cylinders protrude from a reasonably good streamline shape, the eddying wake behind the cylinders causes a general breakaway of the flow from the body behind, and this breakaway of flow is the cause of the high resistance of installations of this type. The streamline "tails" behind cylinders of Fig. 2 were an effort to suppress the turbulent wake, and hence to prevent the breakaway of flow, but proved to have but a negligible effect (*vide* N.A.C.A. Report No. 313). Complete "helmeting" on the lines of Fig. 3 are shown in the same report to be exceedingly effective as reducers of drag—but to interfere prohibitively with cooling.

It was only in 1928 that the nearly simultaneous publication of the results obtained by Mr. H. C. H. Townend at the National Physical Laboratory, with the Townend Ring, and of the N.C.A. tests at Langley Field on the original complete N.A.C.A. cowling that any really important advance towards low drag installation of radial air-cooled engines was made.

Ring Cowlings Generally

There still appears to be a considerable amount of misapprehension as to the relation between Mr. Townend's original work with the Townend Ring and the tests made by the N.A.C.A. on cowlings in 1928. Mr. Townend's invention is clearly described in his patent specification.* The Townend Ring is an annular aerofoil surrounding radial projections from a streamline body, the aerofoil section being arranged to have a positive angle of attack to the local air flow. Mr. Townend found that the inwardly directed downwash from this aerofoil suppressed the breakaway of flow which would otherwise have been produced by the projections, and consequently greatly reduced the resistance of the whole combination.

The earliest account of the N.A.C.A. complete cowling to be published is contained in Technical Note No. 301, which is dated October 13, 1928, some months later than the date of Townend's patent application. This note records the results of tests on a variety of cowlings for radial engines, including types in current use, the "helmet" type, and the "complete cowling" since particularly identified as the "N.A.C.A." type.

This complete cowling may well be described in terms adopted by the N.A.C.A. themselves:—

"Cowling No. 9 completely covered the engine. The air was taken in at the nose and allowed to flow past the engine, which was entirely uncowed, and out of an annular slot, similar in section to some wing slots which have been tested. This type of nose and slot were designed to offer as little resistance to the flow of air over the fuselage as possible, separating air for cooling the engine from the general flow and then feeding it back smoothly through the slot" (N.A.C.A. Tech. Note No. 301).

"When the slot was originally designed for the complete cowling (Nos. 9 and 10) it was hoped that it would tend to decrease the drag because of its effect on the boundary layer. A test made on the nacelle with the slot covered, however, showed that the drag is 10 lb. less at 100 m.p.h. without the slot. . . . It is likely that the cooling air could be collected after it has passed the cylinders and directed out through one or two openings at the bottom or sides with no increase in drag over that with the annular slot. The annular slot is, however, a very convenient means for getting the used

* Junkers British Patents, Nos. 147003, 148889.

* Townend British Patent No. 320131.

cooling air back to the general outside flow." (N.A.C.A. Report No. 314, pp. 20 and 21.)

"The now widespread use of air-cooled engine cowlings has brought forth many modifications of the original N.A.C.A. type. In fact the cowling which was intended to form a smooth streamline shape of the average fuselage with its projecting cylinders has in some cases been reduced to a small continuous ring above the cylinder heads. . . . A cowling of the latter form, commonly known as the Townend Ring, has been developed elsewhere." (N.A.C.A. Tech. Note No. 335, p. 1, dated November 1, 1930.)

It may be noted that the No. 10 cowling mentioned in the second quotation above differs from No. 9 mentioned in the first quotation by the provision of internal cowling shielding the crankcase and thus increasing the air flow over the cylinders and by the use of inter-cylinder baffles. The statements quoted indicate the similarity of the original N.A.C.A. cowling and the early arrangements of Deperdussin. The annular slot arrangement—impossible to Deperdussin on account of the oil-throwing propensity of the rotary engine—is shown to be of no advantage other than convenience. The special arrangements for improving cylinder cooling in the final form (No. 10) are not novel in principle, but only in conjunction with the specific type of cowling. This comment on the lack of essential novelty in the principle of the N.A.C.A. cowl does not in any way detract from the value of the investigation made at Langley Field on cowlings generally. The discovery that a device proposed before the time was ripe for its general adoption could, with improvements and development and under the changed conditions of increased speeds of flight and more effectively cooled engines, be of great practical utility deserves the fullest possible recognition.

It is clear that the ideas underlying the design of the original N.A.C.A. "complete cowling" involved no such novel and broad principle as suppression of the breakaway of flow behind the body by the downwash from an annular aerofoil—a conception entirely novel and one enunciating an aerodynamic principle of first-class importance. The figures in Townend's specification show no approach to a cowling, which, with the body, forms a streamline whole enclosing the engine. The ring is something entirely outside of, and divorced from, the general streamline of the body, and it is extremely doubtful if anyone with a reasonable knowledge of aerodynamics, confronted with these figures for the first time, would recognise them as showing forms likely to have a low resistance. I confess freely that I myself at first sight of the Townend Ring concluded that it looked far more likely to increase than to reduce drag.

Particular attention is drawn to the date of the last quoted of the three extracts from N.A.C.A. reports, which refers to "narrow rings." By November, 1930, the results of Mr. Townend's work were widely known in aeronautical circles throughout the world, and the suggestion that such "narrow rings" were merely developments of the original N.A.C.A. cowl is obviously without foundation. The results obtained with the N.A.C.A. complete cowling attracted extraordinary interest. The great reduction in drag shown was measured on a real engine, driving an airscrew, mounted on a full-scale body at a speed of 100 m.p.h. The tests included cooling tests on the engine when running, and the cooling of the engine was pronounced to be satisfactory. The absence of any doubt as to possible scale effect and the evidence as to cooling were properly regarded as of fundamental importance—the latter particularly so in view of the repeated failures of early low drag cowlings to provide this essential.

The early results published by Townend using the ring showed striking reductions in drag, but not such spectacular figures as those of the N.A.C.A. This difference is not surprising, since Townend was investigating a new general principle and his models were of small scale and conventionalised form, whereas N.A.C.A. were essentially engaged in discovering how far the development of a well-known principle could be carried in practice. It may be noted here that by the time the N.A.C.A. Report No. 314 giving drag tests on a streamline nacelle "Whirlwind" engine, and complete cowling was available in this country, tests made in the Boulton & Paul wind channel on a nacelle

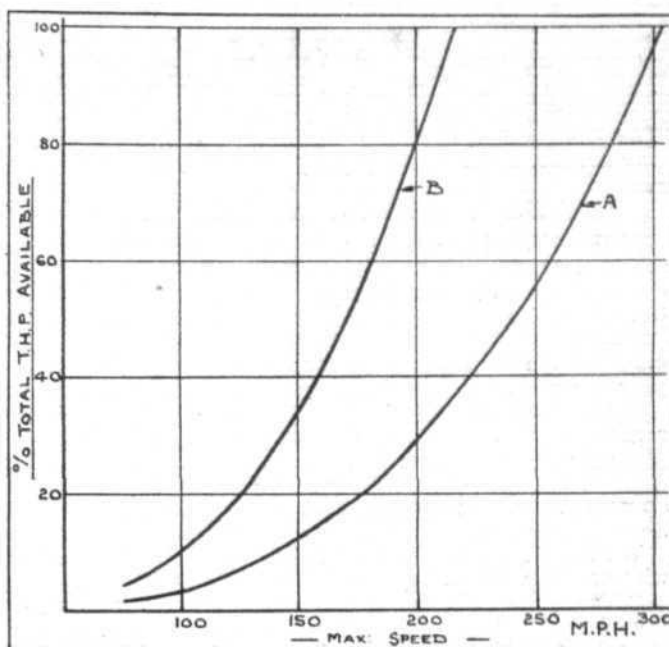


Fig. 4: Percentage of max. t.h.p. available absorbed in overcoming power plant drag for variation in max. speed. (A) Power plant drag = 1 lb./100 ft./sec. per 7.14 b.h.p. (B) Power plant drag = 1 lb./100 ft./sec. per 20 b.h.p.

"Jupiter" engine, and Townend Ring, had shown drags which corrected for the difference in diameter of the two engines, were practically identical with those obtained by N.A.C.A. The British tests were made on $\frac{1}{4}$ -scale models, fully representative, and hence in themselves might be subject to "scale effect," but full-scale evidence that the Townend Ring can equal the N.A.C.A. type cowling as a drag reducer is now fairly conclusive.

The broad principle underlying the Townend Ring gives the device a number of obvious advantages over the N.A.C.A. cowling. In the latter, cowl, engine and body immediately behind engine, must all be of substantially equal diameter. The cowl must curve inwardly forward to a considerable degree to give a "streamline entry" to the whole, and hence restrict the entrance for cooling air. These considerations impose restrictions on body form, which affect field of vision for the crew, field of fire for forward firing guns, and on cooling which are not present to the same extent when a Townend Ring is used. The restriction on the entry of cooling air in the N.A.C.A. type cowling is of considerable importance, despite the reassuring nature of the original N.A.C.A. tests of cooling. These were made with an engine having a direct drive airscrew. There is conclusive evidence that, with such engines, N.A.C.A. complete cowling, with carefully-designed internal passages and proper cylinder baffles, does give low drag and satisfactory cooling. In this country, efforts to use N.A.C.A.-type cowling on geared engines have been disappointing, and with geared and supercharged engines generally unsatisfactory.* Even in the U.S.A. difficulty is generally admitted to occur with geared and/or supercharged engines fitted with N.A.C.A. cowls. This difficulty of cooling in the case of geared engines arises undoubtedly from the increased diameter of the region of reduced airscrew outflow with increased airscrew diameter.

With the Townend Ring, the ring alone must be of a diameter substantially equal to the engine, the body diameter behind the ring may be, for best results, of the order of 0.75 of engine diameter. The pronounced inward curve of the part of the N.A.C.A. cowl is not necessary. Body shape and size are consequently less strictly limited, and view and gun fire less restricted. A less restricted entry and exit for cooling air are provided, and engines which will not cool in an N.A.C.A. complete cowl, cool satisfactorily with a properly designed Townend Ring.

* Fedden, Research on Low Drag Cowling, Aeronautical Engineering, September, 1933.

(The concluding portion of this paper will, later, be dealt with in "The Aircraft Engineer" for February 22 next.)

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

AERIAL MAPPING IN GREENLAND

[2908] We have read with very great interest the article by Marine Lt. Petersen on "Aerial Mapping in Greenland," and note that you refer to the Anglo-Dano-German Alliance which produced such excellent results. As Lt. Petersen mentions, the Eagle cameras were used not only by the Expedition of 1933 but also in that of the previous year.

We feel that we may claim that the remarkably successful results of this Expedition, whose main object was air photography, were due in no small measure to the excellence of our Eagle aircraft cameras, and feel proud that our apparatus has once again upheld the tradition of the British aircraft industry.

We have received a report from the Geodætisk Institut, who organise the surveys, and this reads as follows:—

"The Eagle III cameras have been used in Eyrie mountings for oblique photography by the Expedition to East Greenland. Photography took place at a height of 4,000 metres, and during the difficult working conditions the cameras have functioned very satisfactorily both with hand and automatic electric operation. The photographs taken with the cameras have been sharp and good."

The fact that Eagle aircraft cameras were selected for this in the face of competition of foreign manufacturers of aircraft apparatus is extremely satisfactory, and credit for this must be given to our representative in Denmark—Mr. A. Raffel, who, as a matter of interest, is at present in this country on a short visit.

We feel that the above few remarks may be of interest to your readers, as the fact that British aircraft apparatus was used may be so taken for granted that its share in the success of this or any other similar expedition may be overlooked.

P. T. GRIFFITH,
Director,
Williamson Manufacturing Co., Ltd.

Aldwych, W.C.2.
February 2, 1934.

HOME-PRODUCED FUELS

[2909] I was much interested in Mr. A. H. R. Fedden's article on "Possible Future Developments of Air-Cooled Engines" in a recent issue of FLIGHT, but I cannot understand on what facts he bases his statement that we have no home-produced fuel in England with the exception of small, experimental quantities.

That statement might have been true before the war, but since the formation of the National Benzole Company in 1919, the production of home-produced fuel has gone ahead so rapidly that last year coke ovens, tar distillers and gas-works throughout Britain produced over 35,000,000 gallons of benzole for use as a motor fuel.

Mr. Fedden is probably aware that, prior to the war, benzole was produced in small quantities for use industrially, and that during the war it was in demand as the basis of high explosives. Benzole plants sprang up all over the country and, when the war was over, the producers, in order to keep their plants and the thousands of men they employed in occupation, turned their attention to the production of benzole as a motor fuel.

Most motorists now know that Benzole mixture compares favourably to imported petroleum fuels, particularly in regard to anti-knocking qualities and what is now called

"startability." This is proved by the fact that benzole has been used by many record breakers on land, and, what is of more importance from Mr. Fedden's point of view, in the air.

The fact that the King's Cup Air Race has been won on National Benzole Mixture and that many famous airmen (including Sir Alan Cobham) use it, is ample refutation of Mr. Fedden's statement.

J. W. CLARKE,
Publicity Manager.

National Benzole Co., Ltd.,
London, S.W.1.
January 31, 1934.

GREAT BRITAIN AND CANADA

[2910] I have read and re-read your editorial in the issue dated January 11 on "What do we Want to See in 1934." In all the good wishes expressed, I have looked in vain for a little wish for Canada. India's aspirations are cited and Australia gets a triple mention—on account of the Australian Air Force, the MacRobertson Race, and the Australian Mail contract.

Even tiny Bermuda was not overlooked, and I fail to understand why the editor missed seeing the not-inconsiderable splash of red that represents the Dominion of Canada on the ruddy map of the British Empire.

I sometimes wonder what the younger generation in Canada think of British flying, that is, if they ever think of it at all. Owing to American films, magazines and broadcasting, it is only natural that the interest of the young Canadian is centred on Colonel Lindbergh, Alford Williams and Capt. Frank Hawkes, while little or nothing is known of British accomplishments, military or civil.

Canada has had one solitary visit from a British service aeroplane. Why not wish us a visit from a second. Italy sent us twenty-four. Why not be reckless and wish us a visit from a few British squadrons, these squadrons to land in the East and make a trip across the Dominion to Vancouver. The enthusiasm that would be created by such an event is almost inconceivable.

W. B. BURCHALL
(Advertising Publicity Manager, Canadian
Airways, Ltd.).

Montreal.
January 23, 1934.

[FLIGHT has often shown its keen interest in Canada and its admiration for the fine work carried out by the Royal Canadian Air Force and by Canadian Airways, Ltd., and other civil companies. The reason why India, Australia and Bermuda figured in the leading article to which our correspondent refers was that definite prospects exist for developments in those lands in 1934. Unfortunately, as the Government have broken up R.100, there is at present no immediate prospect of an air link between Great Britain and Canada. Nevertheless we think our correspondent's suggestion of an official visit to Canada by some R.A.F. units an excellent one. It would cost some money, of course, but it would be well worth the cost. We suggest to the Government that an aircraft carrier should be sent over to Canada, to show Canadians that the Americans are not the only people who can design aircraft and can fly them. It would also be a very good idea if the carrier took over some of the latest types of R.A.F. flying boats, as Canadians are particularly interested in that class of aircraft.—ED.]

Honours for Irishmen

ON the recommendation of Commendatore Alessandro Mariani, Royal Italian Consul-General in Dublin, and with the approval of Signor Mussolini, His Majesty the King of Italy has conferred the Order of the Crown of Italy on the following Army Officers and Civil Servants of the Irish Free State for their work in connection with the establishment of the air base for the return of the Italian mass flight from America at Valentia Island, County Kerry last year:—Capt. William P. Delamere, Army Air Corps, Baldonnel

Aerodrome; Commandant Sean O'Sullivan, Department of Defence, Dublin; Mr. John Vincent Fahy, Department of External Affairs, and Mr. John Aloysius Belton, Department of External Affairs.

A Finnish parachute factory

SHELL AVIATION NEWS informs us that the first parachute factory in Finland, named Suomalainen P.A.K. Laskuvarjo Osakeyhtio, has been formed in Helsingfors. At first the factory will make Czechoslovakian type parachutes marked "P.A.K." The capital is 250,000 Finnish marks.

THE ROYAL AIR FORCE

London Gazette, February 2, 1934

General Duties Branch

The follg. are granted temp. commns. as Flying Officers on attachment to R.A.F. (Jan. 14):—

Sub-Lts., R.N.—P. A. R. Bremridge, M. C. Hoskin, W. L. Mayo, M. J. A. O'Sullivan, N. R. Williams.

Lieut., R.M.—J. H. McCahon.

Capt. A. P. C. Hannay, M.C., Cameron Highlanders, is granted a temp. commn. as Flying Officer on being re-seconded for duty with R.A.F. with effect from Jan. 15, and with seny. of Jan. 15, 1929.

The follg. are granted temp. commns. as Flying Officers on being seconded for duty with R.A.F. (Jan. 15):—Lt. A. A. N. Malan, R. Tank Corps; Lt. R. B. Pakenham, Border Regt.; 2nd-Lt. A. F. Anderson, R. War. Regt.

Lt. D. G. F. W. Macintyre, R.N., is re-attached to R.A.F. as Flying Officer with effect from Jan. 20, and with seny. of Nov. 15, 1927; P/O. on probation G. J. I. Clennel is confirmed in rank (Jan. 19). The follg. Acting Pilot Officers on probation are confirmed in rank and graded as Pilot Officers:—R. M. Bradley (Nov. 7, 1933); F. E. H. Cooper, H. M. Cox, R. J. F. Craig, G. W. Golledge, W. M. Graham, B. J. Paul, A. Ross, A. G. Strutt, H. C. S. Vetch, C. H. D. Wardrop, C. F. C. Wright (Jan. 6); P. C. Hilton (Jan. 29). Acting P/O. on probation N. W. D. Marwood-Elton is graded as Pilot Officer on probation (Jan. 6).

The follg. are promoted with effect from Feb. 1:—

Flt. Lts. to be Sqdn. Ldrs.—A. L. A. Perry-Keene, W. A. B. Bowen-Buscarlet, D.F.C., K. E. Ward.

F/O.s to be Flt. Lts.—C. B. Hughes, J. W. Homer, A. W. Sandeman, W. J. Crisham, H. H. Chapman, C. Stephenson, R. A. Chignell, K. Brown, G. F. Whistondale, R. C. Jordan, E. C. Hudleston, K. F. T. Pickles, J. S. Dewar.

P/O. S. J. Marchbank is promoted to rank of Flying Officer (Jan. 23); Sqdn.-Ldr. F. R. Alford, M.C., is restored to full pay from half-pay (Jan. 12); Flt-Lt. (now Sqdn.-Ldr.) W. A. B. Bowen-Buscarlet, D.F.C., is placed on half-pay list, scale A, from Jan. 5 to Jan. 7 inclusive.

Stores Branch

The follg. Pilot Officers on probation are confirmed in rank and promoted to rank of Flying Officer (Jan. 6):—C. H. E. Lyster, E. J. Smith, D. Stephenson.

The follg. are promoted with effect from Feb. 1:—*F/O. to be Flt. Lts.*—P. Alderson, J. W. Hustwaite, M.B.E., H. J. Hunter.

Medical Branch

Warrant Officer T. H. Harding is granted a permanent commn. as Quartermaster and Flying Officer (Jan. 26). The commn. granted to F/O. (now Flt.-Lt.) G. A. N. Knight, M.B., B.S., is antedated to April 27, 1930. Air-Commodore H. V. Wells, C.B.E., M.R.C.S., L.R.C.P., is placed on retired list and relinquishes his appointment as Hon. Physician to the King (Jan. 30). Sqdn.-Ldr. (Quartermaster) J. M. Maxwell is placed on retired list (Jan. 26); Flt.-Lt. E. Corner, M.R.C.S., L.R.C.P., is transferred to Reserve, class D (ii), (Jan. 28).

ROYAL AIR FORCE RESERVE RESERVE OF AIR FORCE OFFICERS

General Duties Branch

B. P. A. Vallance is granted a commn. as Flying Officer in class A (Jan. 30). F/O. T. Buchanan relinquishes his commn. on completion of service and is permitted to retain his rank (Jan. 12).

SPECIAL RESERVE

General Duties Branch

The follg. Pilot Officers are promoted to rank of Flying Officer:—T. H. Clarke (Dec. 11, 1933); J. R. T. Bradford (Dec. 23, 1933).

AUXILIARY AIR FORCE

General Duties Branch

No. 605 (COUNTY OF WARWICK) (BOMBER) SQUADRON.—F/O. B. P. A. Vallance resigns his commn. (Jan. 30).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: L. C. Keeble, to R.A.F. Base, Gosport, 21.1.34, for flying duties vice Wing-Com. L. M. Bailey, A.F.C. M. Henderson, D.S.O., to No. 3 (Indian) Wing H.Q., Quetta, India, 21.12.33, to Command vice Group-Capt. H. Gordon-Dean, A.F.C.

Squadron Leaders: H. I. T. Beardsworth, to R.A.F. Staff College, Andover, 22.1.34, for Staff College Course No. 12. G. E. Godsave, to Air Ministry, Dept. of A.M.S.R., 16.1.34, for Navigational Instrument duties, vice Sqdn.-Ldr. W. Underhill, D.S.C. C. A. Stevens, M.C., to R.A.F. Staff College, Andover, 22.1.34, for Staff College Course No. 12. T. A. Warne-Browne, to Station H.Q., Donibristle, 16.1.34, for Flying duties.

Flight Lieutenants: W. N. Blain, to Air Ministry Dept. of A.M.S.R., 21.1.34. W. A. B. Bowen-Buscarlet, D.F.C., to Air Ministry, Dept. of A.M.P., 22.1.34. N. C. Seward, to No. 5 Flying Training School, Sealand, 5.1.34. J. E. G. H. Thomas, D.F.C., to No. 201 (F.B.) Sqdn., Calshot, 17.1.34. L. T. G. Barber, to Air Pilotage School, Andover, 18.1.34. D. W. F. Bonham-Carter, to No. 30 (B.) Sqdn., Mosul, Iraq, 16.1.34. W. A. D. Brook, to H.Q., Palestine and Transjordan, Jerusalem, 16.1.34. C. M. Heard, to No. 3 (Indian) Wing H.Q., Quetta, India, 30.12.33. N. V. Moreton, to H.Q., R.A.F., Middle East, Cairo, 10.1.34. A. F. Scroggs, to Communications Flight, Iraq, Hinaidi, 10.1.34. The undermentioned Flight Lieutenants are posted to R.A.F. Staff College, Andover, on 22.1.34, for Staff College Course No. 12:—E. B. Addison, I. E. Brodie, O. E. Carter, A.F.C., G. Combe, W. L. Dawson, C. E. N. Guest, S. H. V. Harris, R. G. Hart, M.C., E. J. L. Hope, A.F.C., R. Jones, R. O. Jones, P. J. R. King, A. H. H. MacDonald, J. W. F. Merer, R. Pyne, D.F.C., J. B. H. Rogers, G. R. C. Spencer, O. B. Swain, R. N. Waite, and G. L. Worthington (Stores Branch).

Flying Officers: D. W. Baird, to No. 203 (F.B.) Sqdn., Basrah, Iraq, 10.1.34. L. A. Cubitt, to No. 4 Flying Training School, Abu Sueir, Egypt, 10.1.34. R. H. Maw, to Aircraft Park, India, Lahore, 1.1.34. G. R. Montgomery, to No. 4 Flying Training School, Abu Sueir, Egypt, 10.1.34. J. J. Owen, to No. 70 (B.T.) Sqdn., Hinaidi, Iraq, 10.1.34. R. L. Wilkinson, to H.Q., R.A.F., Middle East, Cairo, 9.1.34.

Pilot Officers: R. G. Stone, to No. 821 (F.S.R.) Sqdn., 15.1.34. The undermentioned Pilot Officers are posted on 16.12.33, on appointment to permanent commns.:—P. H. Agard-Butler to No. 1 (F.) Sqdn., Tangmere, D. P. Barclay, to No. 207 (B.) Sqdn., Bircham Newton. A. E. Cairnes, to No. 207 (B.) Sqdn., Bircham Newton. A. O. D. Cox, to No. 35 (B.) Sqdn.,

Bircham Newton. M. Dawney, to No. 41 (F.) Sqdn., Northolt. G. C. Eveleigh, to No. 43 (F.) Sqdn., Tangmere. H. M. T. Eversfield, to No. 35 (B.) Sqdn., Bircham Newton. C. C. Francis, to No. 18 (B.) Sqdn., Upper Heyford. D. P. Hanafin, to No. 10 (B.) Sqdn., Boscombe Down. E. C. Harding, to No. 10 (B.) Sqdn., Boscombe Down. J. N. Knowles, to No. 9 (B.) Sqdn., Boscombe Down. G. A. Mills, to No. 40 (B.) Sqdn., Abingdon. J. D. Nelson, to No. 12 (B.) Sqdn., Andover. C. R. J. Pink, to No. 26 (A.C.) Sqdn., Catterick. R. G. Prier, to No. 23 (F.) Sqdn., Biggin Hill. A. T. D. Sanders, to No. 12 (B.) Sqdn., Andover. G. F. L. Scott, to No. 1 (F.) Sqdn., Andover. J. Thompson, to No. 2 (A.C.) Sqdn., Manston. G. Thrupp, to No. 40 (B.) Sqdn., Abingdon. J. A. H. Tuck, to No. 57 (B.) Sqdn., Upper Heyford. J. B. Usher, to No. 18 (B.) Sqdn., Upper Heyford. C. H. Brandon, C. J. P. Flood, L. B. B. King, A. V. Sawyer, K. D. Stanion and D. E. B. Wheeler to R.A.F. Base, Calshot.

Stores Branch

Wing Commanders: N. R. Fuller, to H.Q., R.A.F., Cranwell, 22.1.34, for duty as Senior Equipment Staff Officer, vice Sqdn.-Ldr. P. J. Murphy. T. Fawdry, M.B.E., to H.Q., R.A.F., Middle East, Cairo, 10.1.34, for Equipment (Stores Staff) duties.

Squadron Leader: L. H. Vernon, to Supply and Transport Services, Iraq, Hinaidi, 10.1.34.

Flight Lieutenants: L. J. V. Bates, to H.Q., Iraq Command, Hinaidi, 10.1.34. C. B. Horsfield, to Supply Depot, Palestine and Transjordan, 10.1.34. H. A. Sudbury, to Supply and Transport Services, Iraq, Hinaidi, 10.1.34.

Accountant Branch

Flight Lieutenants: O. K. Griffin, to Station H.Q., Netheravon, 21.1.34. C. G. Prior, to Station H.Q., North Weald, 21.1.34.

Commissioned Armament Officer

Flying Officer: R. H. Garner, to R.A.F. Training Base, Leuchars, 19.1.34.

NAVAL APPOINTMENT

The following appointment has been made by the Admiralty:—

Promotion

Lt., Flt.-Lt., R.A.F.—C. A. N. Hooper to rank of Lt.-Com. (seny. Jan. 30).



Royal Air Force—Re-equipment of Units

The following re-equipment of Units has recently taken place:—

Unit.	Details.
No. 16 (A.C.) Squadron	Audax replaced Atlas A.C.
" 503 (B) "	Hinaidi replaced Hyderabad.
" 5 F.T. School "	Bulldog "T" replaced Siskin T.
" "	Tutor replaced 504N.
School of Army Co-operation	Audax replaced Atlas A.C.
R.A.F. College, Cranwell	Bulldog "T" replaced Siskin T.
" "	Bulldog IIA. replaced Siskin IIA.
Air Pilotage School, Andover	Cloud replaced Victoria.
Anti-Aircraft Co-operation Flight	Wallace replaced Horsley.

Part replacement has recently been completed in the case of the following Unit:—

No. 810 Squadron 6 Ripon replaced Dart.

The following Units are expected to complete re-equipment during the next few months:—

No. 99 Squadron	Heyford replacing Hinaidi.
" 602 "	Hart replacing Wapiti.
" 603 "	Hart replacing Wapiti.
" 812 "	Baffin replacing Ripon.
" 504 "	Wallace replacing Horsley.
" 209 "	Perth replacing Iris.

The following Units will probably complete part replacement during the next few months:—

No. 24 Squadron 4 Hart in place of IIIF.G.P.
Air Armament School 4 Hart in place of Wapiti.
No. 810 Squadron 6 Baffin in place of Dart.

The Royal Air Force in Iraq

The Air Ministry announces that with effect from February 1, 1934, the Royal Air Force in Iraq will be designated "British Forces in Iraq."

R.A.F. Trade of Draughtsman

It has been decided that, in future, civilians shall replace airmen in the trade of draughtsman. This decision will be brought into effect gradually as and when airmen now in the trade are discharged.

The Air Force List

The February issue of the Air Force List has now been published. It can be purchased (price 2s. 6d.) from H.M. Stationery Office at the following addresses:—Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

Attachment of Foreign Officers to Royal Air Force Units for Training, etc.

The following attachments are notified:—Lts. Ala and Gharai, of the Persian Military Air Service, to the School of Air Pilotage, Andover, from January 22, 1934, for approximately one month.

BRIEFLY

Mr. Eric Davis.—In recognition of his work with the Cinque Ports Flying Club, Mr. Eric Davis has been elected to the Board of Directors of Brooklands Aviation, Ltd., the proprietors not only of the Cinque Ports Club but also of the clubs at both Northampton and Brooklands.

On an Extended Cruise.—Mr. Fred Sigrist left England for an extended ocean cruise, in the *Arandora Star*, on January 24.

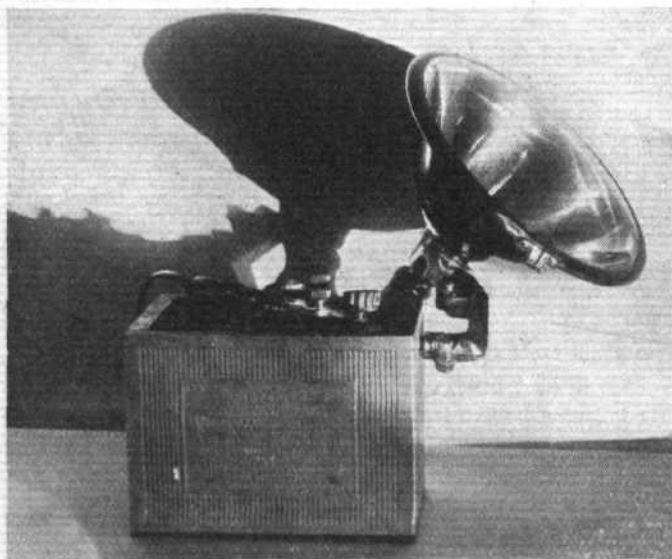
College of Aeronautical Training.—Mr. H. E. Fozard, A.F.R.Ae.S., who has been Superintendent of Training and Progress at the College of Aeronautical Engineering at Chelsea for the past eighteen months, has now also taken charge of the students training at Brooklands, *vice* Mr. Erik Nelson, who is going to Hong Kong shortly in connection with aerodrome inspection and aircraft certificate of worthiness work.

"Big Benzine."—At last someone has hit on a suitable name—"Big Benzine"—for the huge clock which is such a prominent feature on the Thames side of the Shell Oil Company's building on the site of the Hotel Cecil. It is a happy choice, and I do not anticipate any serious objection from the Westminster end of the Embankment.—*Morning Post*.

A Vacuum Oil Appointment.—Mr. J. M. Ainsworth, A.I.S.A., has been appointed Secretary of the Vacuum Oil Company. Mr. Ainsworth, who is a native of Yoxford, Suffolk, was educated at Alleyn's School, Dulwich, and joined the Vacuum Oil Company in June, 1918. After filling a variety of posts in the company, he was posted to the Secretarial and Legal Department, and has been assistant secretary since April, 1930. During the war Mr. Ainsworth served with the Honourable Artillery Company.

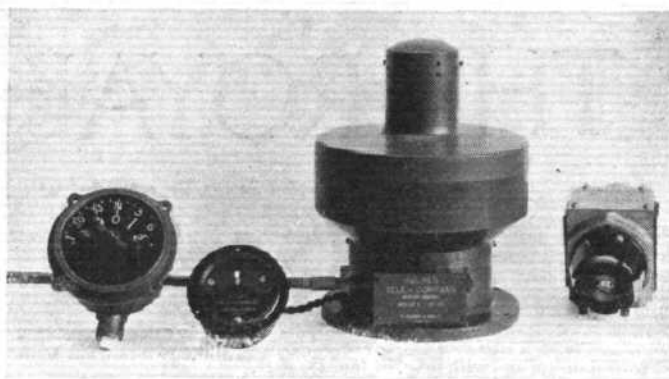
A useful lamp

Of considerable potential value, both to aerodrome and aeroplane operators, the "Portalite" is worthy of investigation. It is marketed by E. B. Meyrowitz, Ltd., of 157, Regent Street, London, W.1, and only weighs a few pounds. It consists mainly of a very efficient reflector, from which a concentrated beam is projected. A beam candlepower of 300,000 is claimed.



BY ITS OWN LIGHT: This photograph of the "Portalite" was taken by the light of a similar lamp. Its compactness and suitability for general emergency aerodrome use can clearly be seen. (FLIGHT Photo.)

It is sold either attached to an accumulator or separate, so that it can be fixed to a bracket in the aeroplane. The former type makes a useful emergency floodlight, of which a number might well be used to light a runway for night landings. The latter should make a satisfactory spot or landing light. The mounting supplied allows of the lamp being tilted in all directions, thus making it suitable for searching, or for use as a beacon or ceiling projector. It can also be supplied with a wide-angle reflector which turns it into a floodlight for illuminating a large area, as, for instance, in the case of a crash, or for work on a machine away from an aerodrome at night.



THE HOLMES TELE-COMPASS: This important instrument, one of many produced by "Smiths" was one of those used by the Italian airmen Lombardi and Mazzotti in their recent Atlantic flight. This is what they cabled to Smiths Instruments: "Smith's compasses worked perfectly during all flight. We are particularly enthusiasts of Tele-holmes that we believe perfect instrument. Best wishes. Lombardi, Mazzotti."

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda: No. 1521. *An application of Prandtl Theory to an Airscrew.* By C. N. H. Lock. Aug., 1932. Price 2s. 3d. net. No. 1539. *Abstract: Flow Past Circular Cylinders at Low Speeds.* By A. Thom. June, 1932. Price 3d. net. No. 1540. *Abstract: Convection of Heat from Isolated Plates and Cylinders in an Inviscid Stream.* By N. A. V. Piercy and H. F. Winny. Sept., 1932. Price 2d. net. No. 1553. *Summary of the Present State of Knowledge Regarding Sheet-Metal Construction.* By H. L. Cox. Aug., 1933. Price 1s. net. London: H.M. Stationery Office, W.C.2.

Brassey's Naval and Shipping Annual, 1934. Edited by Com. C. N. Robinson, R.N. and H. M. Ross. London: William Clowes and Sons, Ltd. Price 25s. net.

Behind the Smoke Screen. By Brig.-Gen. P. R. Groves, C.B., C.M.G., D.S.O. London: Faber and Faber, Ltd. Price 15s. net.

Mechanical World Year Book, 1934. Emmott and Co., Ltd., Mechanical World Office, 31, King Street West, Manchester. Price 1s. 6d. net.

NEW COMPANIES REGISTERED

AIR TRANSPORT FINANCE, LTD.—Capital £100 in £1 shares. Objects: to acquire and hold shares, stocks, debentures and debenture stocks, etc. Solicitors: Slaughter & May, 18, Austin Friars, E.C.2.

PLANE PUBLICITY, LTD.—Capital £100 in 1s. shares. Aerial and general advertising contractors, and agents, aeroplane and aerodrome proprietors, aerial and land surveyors, photographers, etc. Christopher Draper, of 2, Southampton Street, London, is one of first directors. Secretary: M. A. Carpenter.

THE EXACTOR CONTROL CO., LTD.—Dorland House, 18/20, Regent St., W.1. Capital £3,000 in £1 shares. The objects are to acquire the world rights, and to manufacture the Hele-Shaw Beacham Hydraulic Remote Control Gear. Directors W. H. Parkin of The Mount, Bearsted, Maidstone. D. Salisbury Green, Grey Gates, Harpenden, and Captain A. V. Harvey of Magazine Gap Road, Hong Kong (director of Far East Aviation Co., Ltd.). The Technical Advisors are Dr. H. S. Hele-Shaw, D.Sc., M.D., F.R.S., and Mr. T. E. Beacham, B.Sc., A.C.G.I., A.M.Inst. C.E., A.M.I.Mech.E.

PATENT AERONAUTICAL SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1932

Published February 8, 1934.

- 9,682. ZAP DEVELOPMENT CORPN. Aircraft and control thereof. (404,270.)
- 9,683. ZAP DEVELOPMENT CORPN. Aircraft. (404,270.)
- 14,972. H. R. RICARDO. Apparatus for converting reciprocating into rotary motion or *vice versa*. (404,272.)
- 19,479. REID & SIGRIST, LTD., and G. H. REID. Inclination meters for use in aircraft. (404,288.)
- 20,062. H. MASCOV. Ornithopter. (404,356.)
- 31,658. B. K. O. LUNDBERG. Means for facilitating plotting of navigational courses. (404,433.)

APPLIED FOR IN 1933

Published February 8, 1934.

- 5,590. SOC. D'EXPLOITATION DES BREVETS L. SIMON. (Amortisseurs Sanchok.) Relief valves for pumps for aircraft. (404,480.)
- 12,061. FUSION-MOTEURS. Evaporative cooling systems for cyls. of i.e. engines. (404,517.)
- 34,880. C. L. FLORISSON and SOC. DE CONDENSATION ET D'APPLICATIONS MECANIQUES. Echo-sounding apparatus for use on noisy aircraft. (404,594.)

Secret Patents Re-Assigned to the Inventor

APPLIED FOR IN 1918

Published February 8, 1934.

- 19,547. F. W. HILL. Automatic sight for use with heavy guns in aircraft against ground targets. (404,362.)